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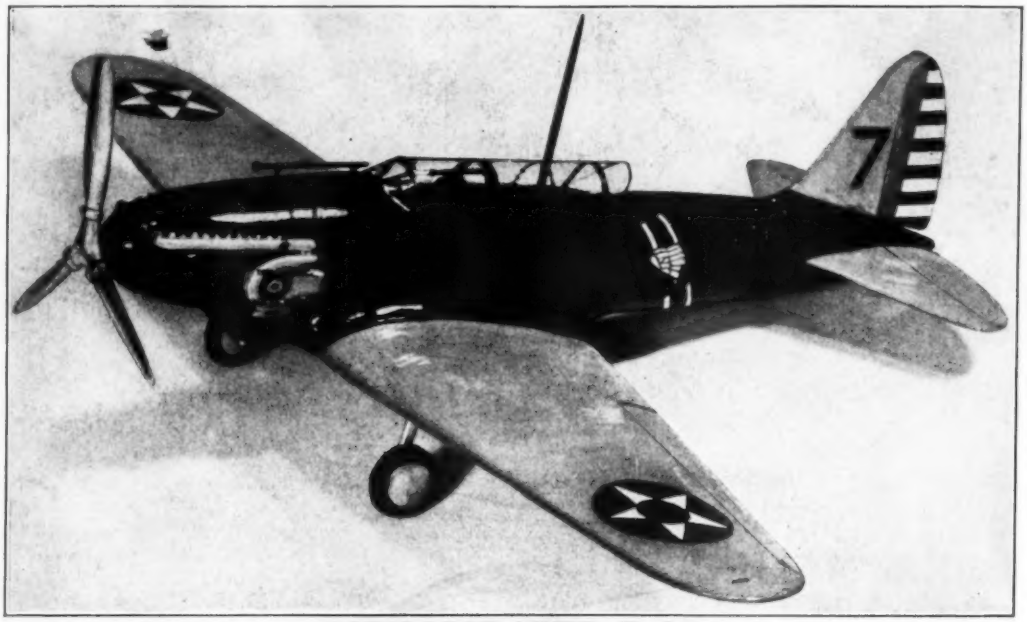

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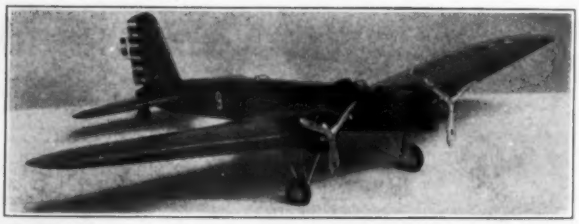

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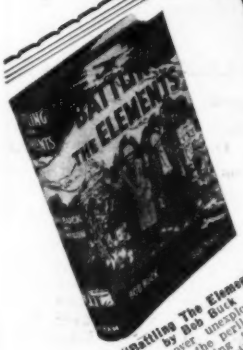

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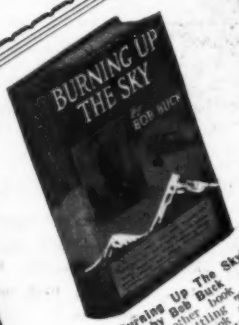

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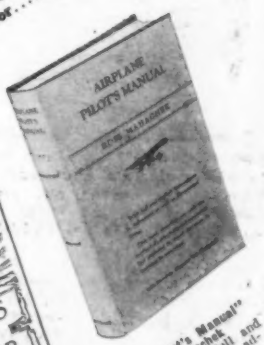

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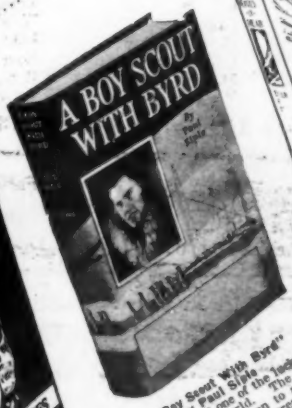

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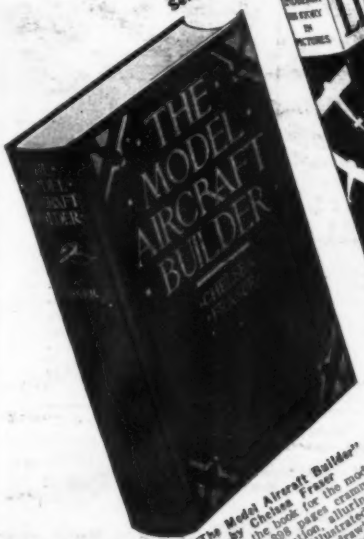

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7th YEAR OF PUBLICATION

VOL. XII *NO. 6*

Edited by Charles Hampson Grant

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A five passenger Russian glider, the GN-4, used as one of the tows in an "air train" (Sovfoto)

The Glider Grows Up

Features Contributed by Gliding to Airplane Design and What Glider Pilots Hope to Accomplish in the Future

By FLETCHER PRATT

PART TWO

IN 1920 Klemperer set a new world's record for gliders, a record that was achieved in a certain sense, without the inventor knowing quite how he did it. He realized the possibilities in streamlining, but without realizing the extra efficiency that a little more weight would give him, and without working out all the possibilities of the glider. His ship was far from perfect; it had a sharp sweepback, the ailerons were the old flapping type used on the wartime Taubes, the wings were very deep and almost rectangular, the aspect ratio low.

During the winter and following spring the other technicians worked out the aerodynamic possibilities much farther and in 1921 Klemperer's ship was already a back number. G. Madelung won the Rhön competition and more than doubled Klemperer's records for duration and distance with an entirely new type of craft, the famous Vampyr, which became the ancestor of nearly all modern gliders and more modern airplanes than you can count.

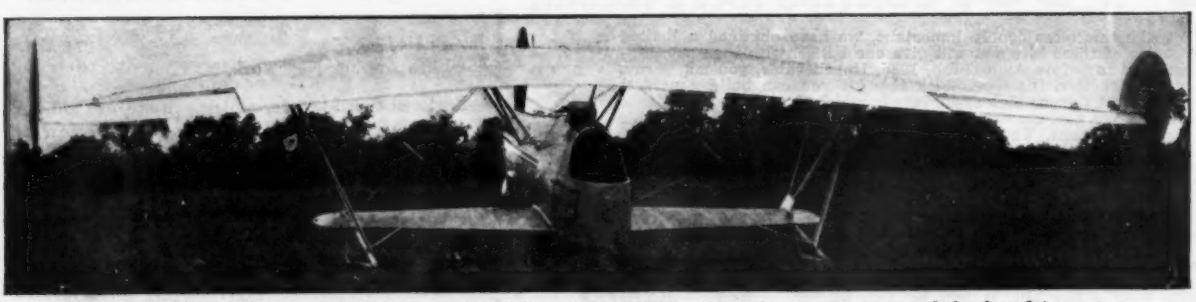
The Westland Pterodactyl, the direct outgrowth of glider experiments

Like Klemperer's ship, the Vampyr was a cantilever monoplane, but there the resemblance ended. The fuselage was much longer and the tail higher up. Instead of Klemperer's low-wing, it had a wing higher than any monoplane ever built except some of the early Moranes. From these it differed by having two long diagonal braces to the base of the fuselage, with two short struts directly over the fuselage. It had no sweepback at all; for the first time the wings were sharply tapered toward the tips to avoid loss of efficiency at this point. The aspect ratio shot up to what was then considered the fantastic figure of 20 and the ailerons were long, thin strips, automatically connected with the rudder controls.

The Vampyr contained so many new tricks that she practically stabilized glider progress as far as the general type went. Most of the new features—straight wing, high aspect ratio, sharply tapered tips—were quickly adapted to the low-wing gliders and by the 1922 meet all the machines were of thoroughly modern type. The low-wingers died out after a while, not for any aerodynamic reasons, but because they were continually smashing wings against ground obstacles. But by this time German glider progress had begun to attract attention in other countries and there was a second German gliding society, the Rositten Society.

The two combined on the design of a remarkable soaring plane, and practically all modern soarers are variations on this design. It was called the Rhöngeist—Spirit of the Rhön. The leading features were ease of construction and transportation, united with performance. Basically, it was a high-wing type with a rigidly braced center wing section, supported by only a single wing beam which, with the leading edge of plywood, formed a box girder. There were two sharply tapered outer panels with ailerons running their whole length. They were detachable. The original Rhöngeist had braces running to the base of the fuselage; in the variations on the design these were sometimes suppressed, as in the Darmstadter, and sometimes changed to narrower struts right over the fuselage as in the Luftikus.

These were mere refinements of the original design, of little importance to anything but gliders. Some of the other refinements, however, were important enough to find a place in the regular powered airplanes. Perhaps the biggest of these was the gull wing, which did not come from the German experimenters at all, but from a group of students at the Polish



You are looking at the rear of the Westland-Hill Pterodactyl MK.V. Note the gunner's seat and the free firing range

The Focke Wulf F19a Ente, one of the few planes developed with the elevator in front of the wing. Dynamic soarers will be of this type

government aircraft factory. As they were inexperienced with gliders, they gave their Rhöngeist a thorough wind-tunnel test. Discovering that the small wing section directly over the fuselage contributed very little to the lift, they tried eliminating it altogether and enclosing the fuselage struts in an airfoil section. It worked so well that the arrangement was immediately carried over into the Polish fighters.

Landing gear problems also came in for a good deal of attention, even Klemperer's "panted" wheels producing altogether too much drag on a machine where no drag could be afforded. Now a glider does not operate under the restrictions of a powered plane with regard to landing; its landing speed, in fact, is practically zero and the pilots had learned a technique of side-slipping in that it enabled them to land on a dime. A skid landing gear was all right and skid landing gears are still used on the primary machines. The trouble with them, however, is on the take-off; it proved hard to snap a heavy soaring plane into the air from skids. Therefore new types began to appear, the most interesting were the single-wheel and the detachable types.

The first is now being rapidly taken over by powered planes; it made its first appearance in the Coupe Deutsch de la Meurthe races of 1931 and has now become quite common among light European planes. The latter was one of Alexander Lippisch's ideas—a carriage which furnishes wheels for the glider to take off and is discarded immediately (by throwing a lever) as soon as the glider is in the air. The glider then lands on a skid which it carries permanently. This device also has finally been taken over by powered planes; Wiley Post's "Winnie Mae" was fitted with exactly this arrangement when he started out on his proposed transcontinental stratosphere flight.

A few of the 16 different types of gliders present at the 9th All Union Glider Meet in Russia

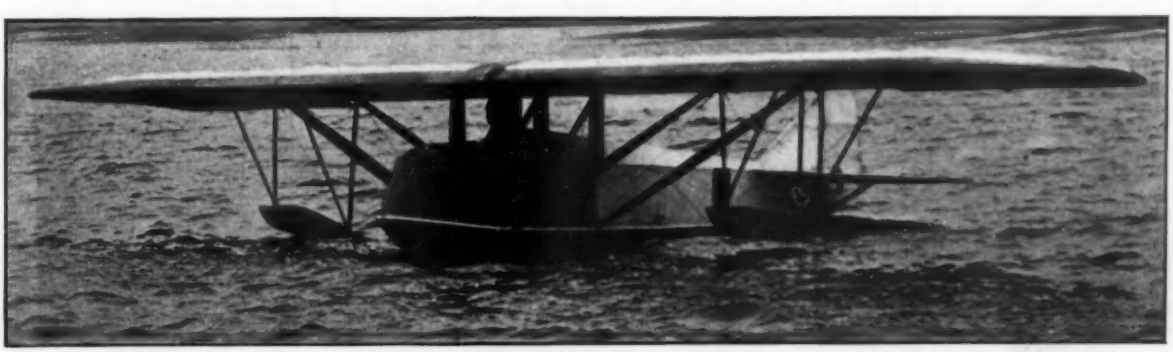
Other improvements of special interest only to gliders, have been the single-spar wing, the elimination of the vertical fin, the one-piece elevator and the outrigger tail; though as all are recent, some of them may turn up among the powered planes soon.

With the development of the Rhöngeist and the models that more or less copied it, a change came over the character of glider experiments. It became obvious that the standard type of glider had about reached its limits except for minor improvements and the new records more skilful pilots could extract from it. Pilot Grönhoff for instance, did over twenty miles, sometimes reaching a height of 4,000 feet in a two-seater, which is about as much as one can expect from any standard machine without a power plant. At the same time the successes of the Germans made gliding a popular pastime. Russia and Italy took it up most enthusiastically. In both countries, glider schools were started for boys and girls, starting with building models, then working into gliding and eventually into flying.

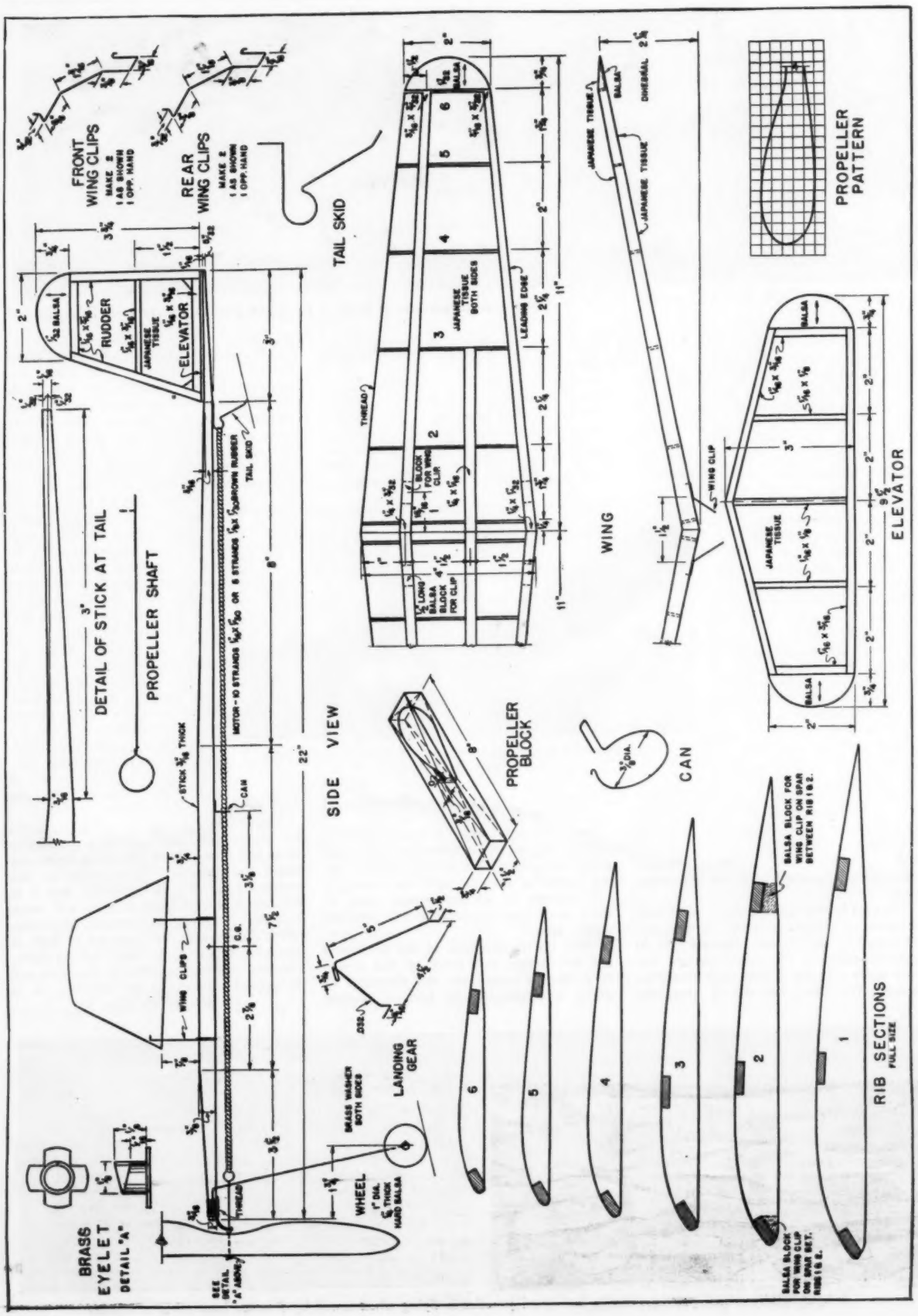
But the gliders were still modified Rhöngeists and the original German glider technicians began to look around for the possibilities in a radical change of design. One of the most interesting efforts in this direction was Alexander Lippisch's Storch. The Storch was tailless and it can be called the first successful tailless flying machine.

Theoretically a tailless machine should be somewhere near perfect; practically there had always been difficulties, centering about the controls. There must be two rudders (one at each wing-tip) and it is difficult to adjust them so they will work together on turns in opposite directions. More serious still, the same set of flaps at the wing tips must be used both as elevators and ailerons, together as elevators and in opposite directions as ailerons. It is

(Continued on page 40)



A hydro-glider which provides thrills and good practice in flying when towed by a motor boat (P & A Photo)


FRONT WING CLIPS
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REAR WING CLIPS
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PROPELLER PATTERN
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ELEVATOR
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BALSA
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TAIL SKID
STICK 3/16" THICK
CAN
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SIDE VIEW
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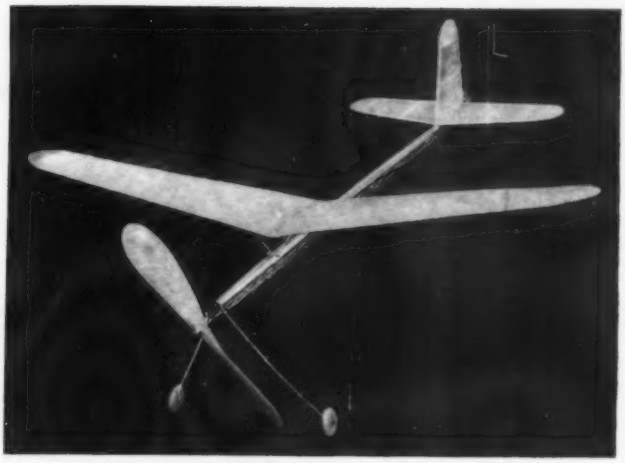
WING
WING CLIP
DIHEDRAL
LEADING EDGE
THREAD
BLOCK FOR WING CLIP
1/4" LONG BALSA BLOCK FOR CLIP
CAN
3/8" DIA.
ELEVATOR
BRASS EYELET DETAIL "A"
BRASS WASHER BOTH SIDES
LANDING GEAR
WHEEL 1" DIA. 1/8" THICK HARD BALSA
SEE DETAIL "A" ABOVE
BALSA BLOCK FOR WING CLIP ON SPAR BET. RIBS 1 & 2.
BALSA BLOCK FOR WING CLIP ON SPAR BETWEEN RIB 1 & 2.
RIB SECTIONS
FULL SIZE

Building a Light Outdoor Tractor

A High Altitude Plane With Free Wheeling Propeller That You Can Construct Easily from These Plans

By GILBERT MACLEAN



A graceful ship with a steady powerful climb

PROBABLY many young model builders remember and have possibly built small indoor stick models that have been on the market for a number of years. The main object of these airplanes was to provide a plane which would fly, yet which could be easily and simply constructed.

In presenting this model for the model builder, great care has been taken to embody these same simple operations without intricate and complicated work and without changing the design and form of the plane; so that it will give a performance commensurate with the best contest models. This provides a chance for the mere novice "to break into" the contest field. One might say that it is the first step from the amateur model to the expert's contest model. The ship is not very large, having only a span of twenty-two inches and the wing area is sixty-eight square inches. This places it in the "B" class. It cannot be used in all contests. However, in many of them, there are "Free-For-All" events, in which case, this ship may be used with good effect. If the weight rule is included in the particular event in which you wish to enter, the weight of the model may be increased to one and one-third ounces, as required, by adding weight to the wheels. When it is necessary to weight the model this is the proper place to put the weight, unless you desire more rubber, a larger propeller and a larger motor stick. This, however, is not always possible or advisable. Adding weight to the wheels will give your model unusual stability and through this means increase its efficiency in flight.

The little ship has been primarily designed as a fast climbing altitude plane, basing its design around the theory that duration is more often obtained by models whose propeller is of medium size, yet which has sufficient power to have it climb rapidly to a great height. Under these conditions it is more likely that the model will find a rising or thermal air current upon which it can fly for longer duration. Then again, while gliding, the propeller is smaller than the usual duration ship. This adds to the efficiency of the glide as the propeller then gives little resistance. This is true, even though the propeller may be fitted with a free wheeling device, as in the case of this model.

The motor stick has been made unusually long in order to get more turns upon the rubber which will compensate for the fact that the propeller's diameter is not large but turns faster than ones used usually on duration ships. The performance of this model is unlimited. The duration of the propeller is about seventy seconds. However, at the end of the seventy second period it should have attained great altitude. Even in still air the glide added to the power-driven time should bring the duration well up into the two or three minute class. The model has made some remarkable flights, has proved unusually stable and should be a joy to any model builder who completes its construction. Without question you will want to build this little machine, so we will now tell you how to proceed.

Motor Stick

Start your construction by making the motor stick. Cut it to shape and sand lightly. Make it from a piece of medium hard balsa, 22" long, ⅛" high and 3/16" wide. Three and a half inches from the end which you select as the front end, place a mark. Bevel the *top* surface of the stick down toward the nose so that the height of the stick at the nose is 3/16". Place a mark on the top of the stick eleven inches from the rear end of the stick and another on the side three inches from the rear. At this latter point measure up 3/16" from the bottom of the stick. From this point draw a line forward and upward along the stick to the point on the upper side eleven inches from the rear. Now, on the rear end of the stick, mark a point 5/32" up from the bottom of the stick. Draw a line from this point forward, down slightly to the point which is three inches from the rear end of the stick.

The long tail arm gives excellent stability

Now, cut away the top of the stick to these lines. See side view drawing. When this is finished, bevel up the lower side of the stick from the point three inches from the rear, to the rear, as shown in the drawing. The stick at the rear should be 1/16" deep. Throughout its length the stick is 3/32" wide. Do not sandpaper the side of the top stick at the rear. The elevator is to be cemented to this surface.

Wing

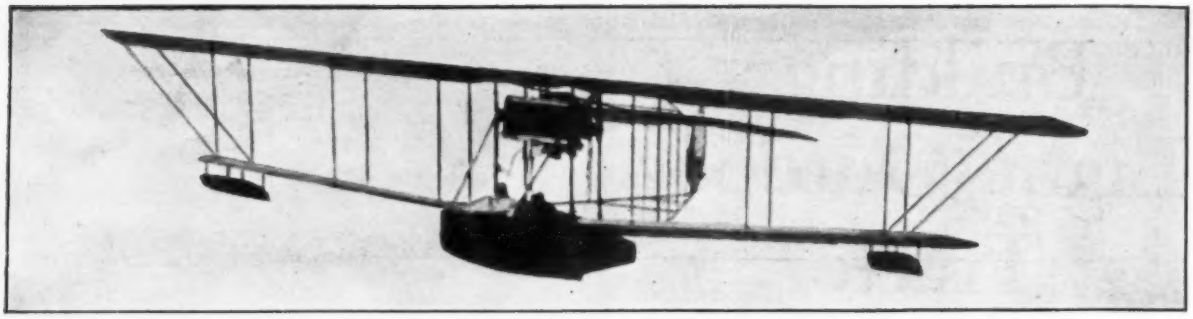
Next proceed to make the wing. The first operation is to cut out the ribs, using the patterns on the drawing. The notches in the ribs which are cross-lined, indicate where the spars are to pass through.

Next make your spars. The front and rear spars each are 10⅝" long. There are two sets of them. As the wing is tapered, the spars do not run straight from tip to tip. Therefore, the wing is made in two sections, before cementing the spars together. In cutting the spars, it is wise to cut each one from the same strip of wood, taking pieces 20⅝" long and cutting them in half.

Both the front and rear spars are ¼" wide and 3/32" deep at the center of the wing. On the drawing the front spar is shown as 1/32" deep. This is an error. They should be bevelled slightly from the center to the tip, so that the thickness is 1/16" at the wing tip. The width at the wing tip is 3/16". The center spar is 8½" long, ¼" wide and 1/16" thick. It should be cut in half.

Now, mount your ribs on the spar, cementing each in its proper position, as indicated by the measurements. It is

(Continued on page 42)



The Sopwith Bat Boat No. II, developed from the early military Gun Bus in the early part of the war

Sopwith Airplanes of "The War"

How the Great Line of Sopwith Airplanes Was Developed from Pioneering Experiments—Important Features of the First Sopwith Military and Naval Air Fighters

By W. R. R. PUGLISI

This is the first of several articles on the birth and development of the famous Sopwith warplanes, which will be published by MODEL AIRPLANE NEWS. Many interesting facts concerning their performance and construction will be given, together with plans of the most important types.

THE articles to be published from time to time under the above title will deal with the airplanes built by the famous pioneer in the British Aircraft field, T. O. M. Sopwith, who was the British challenger in the Yacht races this year.

The machines to be discussed were used to the utmost advantage by practically every Allied country, including America.

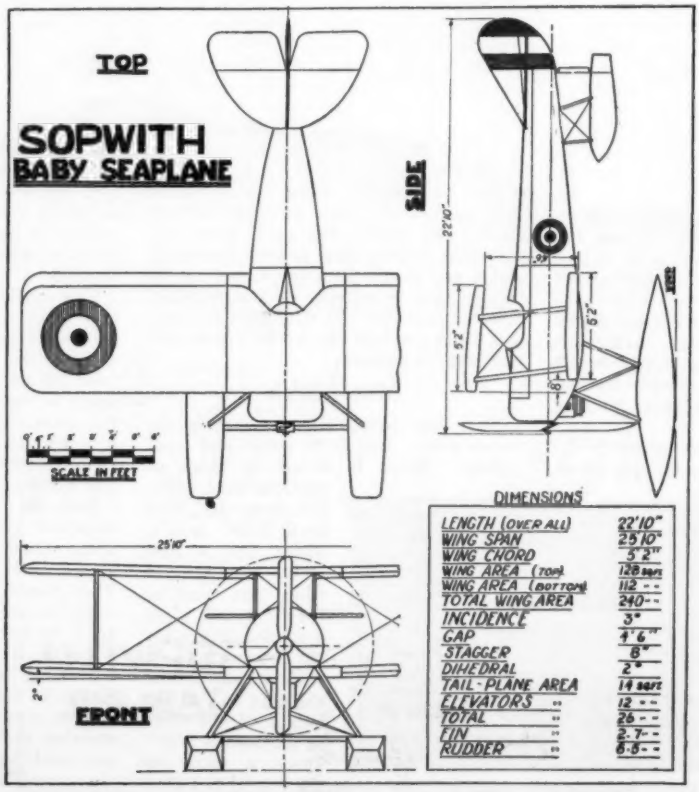
The airplanes built by the Sopwith Aviation Company are now being manufactured by the H. G. Hawker Engineering Co. of Kingston on the Thames. The original concern went into liquidation in September 1920, when heavy losses came about as a result of the sale of their motor bicycles being limited and the demand for airplanes having dropped to a low level.

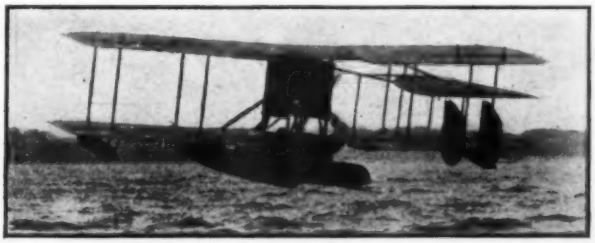
The modern Sopwiths or Hawkers as they are now known, are considered standard equipment for pursuit, interceptor and observation work for more than six nations. The speed and agility of the Hawker Super Fury is considered the fastest in the world and at present, a new Super Super Fury is under construction. This plane is estimated to race along at 270 m.p.h. or about 50 m.p.h. more than our own Boeing P26. The chief engineer of the Hawker plant is F. I. Bennet with Mr. Sopwith holding the position of joint managing director.

The first Sopwith plane appeared shortly after the innovation of motor-driven airplanes in England and credit is given to Sopwith for the earliest of triplanes when only monoplanes and biplanes were the rage. Before the introduction of his first triplane, Sopwith's planes were mostly of the box type, underpowered and containing a maze of wires. After several fruitless years of designing and building flimsy affairs, Sopwith hit his first real design, the "Tabloid." Although this plane antedates the War by some eleven months, this plane is being discussed mainly because it illustrates the extreme change in airplane design, both aerodynamically and structurally since that time.

The first "Tabloid" built for Mr. Hawker, the renowned Sopwith pilot, was a two-place side-by-side and powered with an 80 h.p. Gnome Rotary engine. This original side-by-side machine was a decided change from the open frame types that were prevalent on the flying fields of Europe in the days before the war. The "Tabloid" had a balanced rudder; the vertical fin had not as yet been included. The skid type landing gear was nothing new but was a great help to cub pilots with tipping tendencies, and even as late as 1916, "Tabloids" were seen on the western front with this old style gear. Had Sopwith introduced ailerons instead of wing warping for lateral control, the merits of this plane would no doubt have been far greater than they really were.

In the single-seater type ordered by the Air Ministry, the original machine underwent some minor changes; i.e., the struts were more angular, the skid was done away with on some machines and the fin included, making the rudder unbalanced. The span of the planes were both 25'6" with equal chords of 5'1½". The length overall was 20'4" and a very small dihedral angle of 1°5' was used. The gap and





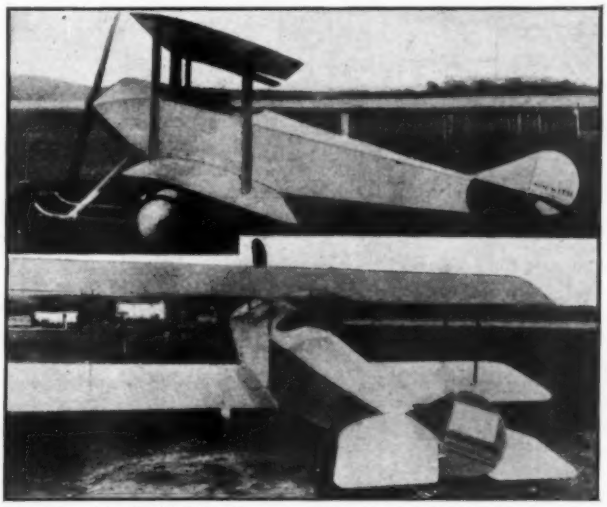
Two views of the Sopwith Amphibian Bat Boat No. I, one of the first Naval Aircraft of the war

stagger were 4'6" and 11" respectively. The weight empty was 730 pounds and a military load of 390 pounds brought the weight loaded to 1,120 pounds, including the pilot. Some form of the "Tabloid" single-seaters were introduced with a Vee type of landing gear although the skid type gear was well liked by pilots who landed tail high. The last modification of the "Tabloid" replaced the system of wing warping with ailerons, thus making the ship more maneuverable.

For a few years previous to the introduction of the "Tabloid," Sopwith had maintained one of the earliest of British flying schools. He had built a quantity of pusher type planes for student training which were quite stable and could stand a lot of punishment from the students. At this stage of aviation, pilots' certificates were few and far between as the cost of learning to fly in pre-war days as rated with flying tuition today, could very well be illustrated by trying to buy a chicken dinner with the price of a ham sandwich. Flying schools made huge profits and were self-supporting if they had four or five students.

Sopwith opened up a few schools throughout England and soon after his "Tabloid" became recognized, he began developing the "Gun Bus." This machine was a modification of the pushers employed by the Sopwith aviation schools. An order had been given to Sopwith by the Greek government for a number of the modified school type, mounting machine-guns in the forward nacelle and on the side of the fuselage.

When war was declared, the British navy took these pushers over and the pontoons which were ordered with the planes were changed to landing gears. At first they were equipped with Gnomes of 100 hp. but were later replaced by the 150 hp. Sunbeam motors. The wing span of this machine was greater than any other type ever produced by Sopwith, being 50 feet. The chords of



The Sopwith "Tabloid" of 1913. Note the skids used to prevent nosing over. It had a speed of 100 miles an hour; remarkable at that time

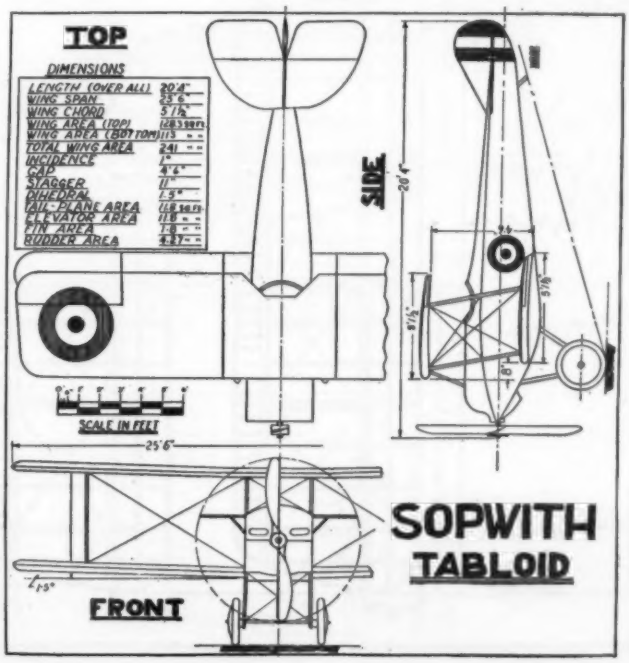
both planes were similar to the "Tabloid's" 5'1½" although the profile sections differed. The wings of this craft were braced by four sets of interplane struts to each side and the gap between them was 4'6". The propeller, a pusher, swung in a wide arc between the bamboo empennage. An old saying of the mechanics of these planes was: "Allow a bird its freedom amongst the tail booms; if it gets out, a wire is surely missing." The length of the pusher was 32'6" from prop hub to the tip of the rudder. Its high speed was approximately 80 m.p.h. and its landing speed 40 m.p.h. In appearance, the "Gun Bus" was very similar to the Vickers and the Fighting Experimentals produced by the Royal Aircraft Company, and was often mistaken for these two ships. Mass production soon got under way and many were shipped to the western front for service with the army. They made a good name for themselves, having a vision of almost 120° in front and a fairly good vision from the rear.

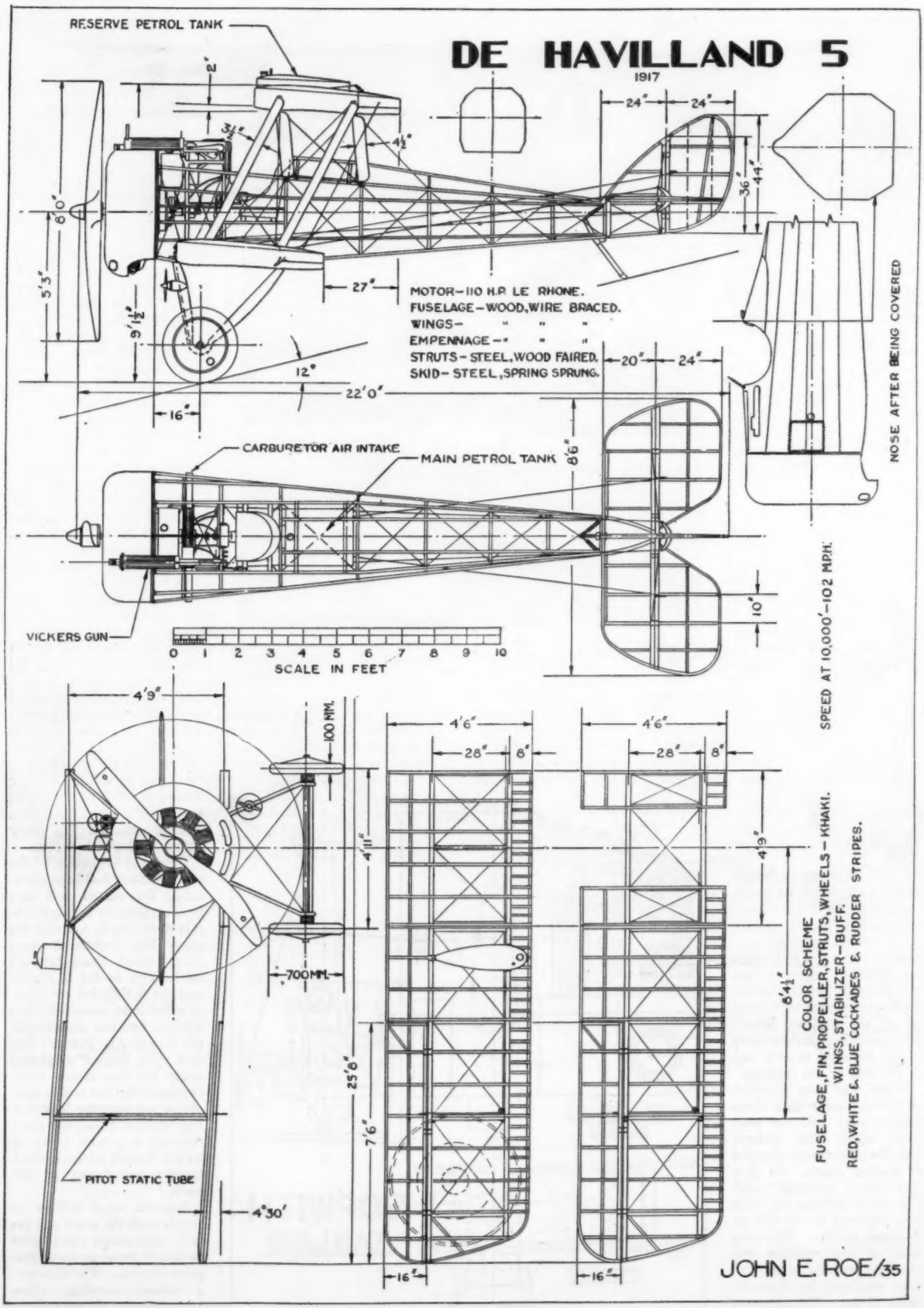
McCudden, one of England's greatest aces, started his aviation career in number 3 squadron servicing "Gun Busses" while he was a private in the R.F.C. His early rides were in the gunner's pit and he lazily dreamed of the day that he would be flying Sopwiths. He later realized his ambitions and became a combat flyer, piloting many planes of Sopwith design.

From the beginning of the war, the navy had been clamoring for planes and had been continually trying to obtain them only to find that the army had purchased them first. Small wars between the officers of the R.N.A.S. and the R.F.C. led the higher officials to merge the two bureaus into one department, the Royal Air Force. The first "Gun Busses" originally made for the Greek navy, numbered but ten and in spite of the fact that the R.N.A.S. appropriated these, the army received a greater quota of all the British Aircraft much to the resentment of the navy.

Sopwith was willing to supply both the army and the navy with planes and so proceeded to draw up some seaplane designs. The first was a torpedo-carrying plane

(Continued on page 39)




DE HAVILLAND 5
1917
RESERVE PETROL TANK
MOTOR-110 H.P. LE RHONE.
FUSELAGE-WOOD, WIRE BRACED.
WINGS- " " "
EMPENNAGE-" " "
STRUTS-STEEL, WOOD FAIRED.
SKID-STEEL, SPRING SPRUNG.
CARBURETOR AIR INTAKE
MAIN PETROL TANK
VICKERS GUN
SCALE IN FEET
NOSE AFTER BEING COVERED
SPEED AT 10,000'-102 MPH.
PITOT STATIC TUBE
COLOR SCHEME
FUSELAGE, FIN, PROPELLER, STRUTS, WHEELS-KHAKI.
WINGS, STABILIZER-BUFF.
RED, WHITE & BLUE COCKADES & RUDDER STRIPES.
JOHN E. ROE/35

Picture number ONE

Picture number TWO

Airplane Observers Contest—No. 3

$50.00 in Cash Awards Will Be Given to Readers Who Name These Planes Correctly

THOUSANDS of readers of MODEL AIRPLANE NEWS have been very busy trying to determine the accurate names of the airplanes appearing in the Airplane Observers Contest, part No. 1 and 2. Many have become so familiar with airplanes in general use that they can give the name and designation at a glance.

In the past two contests several of the names of the airplanes have been given, the purpose being to place these names under the correct pictures. However, this month we feel that our picture fans have had enough practice in naming many airplanes, so here are six pictures unnamed. See if you can tell what they are. You will not only find it a fascinating pastime, but highly instructive, to enter this contest. Many of our aviation experts have started their careers by participating in some minor activity of a similar nature. Here is your chance! It is easy. Start now!

This is all you have to do! Write the correct names of the six airplanes on the coupon at the bottom of the page, placing the name of picture one on line one; picture two on line two, and so on, for all six pictures. When you name the ships be sure that you give the complete name with the model number, if there are any numbers. Only entries with complete names given will be eligible for the award. For instance, merely "Curtiss Hawk" is not correct. The correct form is "Curtiss Hawk P6-E".

Finally print your name and address clearly in the space allowed. Neatness and simplicity count. Cut out the coupon and mail it to the Model Airplane Observers Contest, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

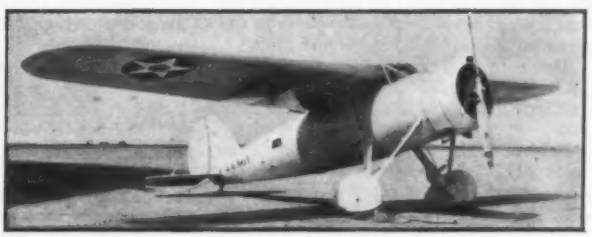
All entries in this, the July contest, must arrive in this office by midnight, July 6th, 1935, in order to be eligible for an award.

(Continued on page 47)

Picture number THREE

Picture number FOUR

Picture number FIVE



Picture number SIX

No. 1..... No. 4.....

No. 2..... No. 5.....

No. 3..... No. 6.....

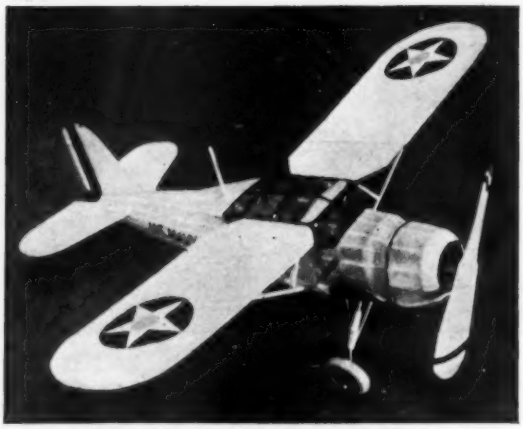
Name ..... Address .....

(Print Plainly)

Build This Model of the New Curtiss Fighter

Here You Have Complete Data Which Shows How to Build and Fly the Sensational New U.S. Navy Fighter

By WILLIAM WINTER and WALTER McBRIDE



Up to date, graceful and a fine flier

THE new XF13C-1 Curtiss Experimental Fighter is the last word in pursuit ships. Contrary to the trend toward low-wing designs in late years, this ship is a high-wing cabin job with retractable landing; which when folded fits flush with the fuselage. Wing slots and flaps are incorporated in the design and insure a versatile performance. This latest demon of the air is capable of tremendous speed.

The proportions of the real plane make possible a graceful model of excellent flying characteristics, and you will be greatly pleased with the performance of this plane if you build it according to the following instructions.

Fuselage

The bulkheads are cut to shape from 1/16" sheet as detailed on the plan. Cut the main notches designated, mark the locations of the auxiliary stringers and fasten the four main stringers of 1/16" sq. in place on the widest bulkheads. Allow to dry and then locate the rear bulkhead. It may be necessary to press the stringers to obtain the correct curve at the rear and to eliminate strains that interfere with the alignment of the fuselage. After cement has set, glue the remaining bulkheads in place. Cut the remaining notches as required allowing for any irregularity in your work and cement the auxiliary stringers in place. Bend the rear hook to shape from .028 music wire and fasten to the rear bulkhead (cross grain).

The rear plug is shaped from a block 1⅛"x15/16"x11/16" as shown on the top and side views and cemented to bulkhead #10.

Former B is cut to the proper shape from 1/16" sheet and cemented in position. Block D is a small piece of balsa 2⅞"x9/16"x5/16" cut as shown on the fuselage plan and fitted against bulkhead #3 to form the peak of the windshield. The windshield structure is of 1/16" sq.

Two pieces of 1/16" outside diameter aluminum are cut to the length given and passed through the fuselage at the position shown on the top and side views.

To cover, long strips of Jap tissue must be used to avoid wrinkles. Clear dope is used to apply the covering. All excess paper should be trimmed off and the frayed edges doped down. Finished covering may be lightly doped.

Getting away for a flight of 300 feet. It is very stable

Tail wheel housing is formed from a block 3/16" x 3/16" x 2⅛" as detailed and attached to the fuselage. The tail wheel is 1/16" thick and ⅜" in diameter and is held in position by small pieces of wire.

The windows and windshield are of cellophane. The edges may be trimmed with black dope or lacquer.

Being a Navy plane, the fuselage is silver.

What could be more realistic?

Landing Gear

The oleo struts of ¼" sq. are cut to their correct lengths and shape as detailed. Small pieces of bamboo are forced into either end as shown on the plan. The finished struts are attached to #2 bulkhead at the position designated. The axles of .034 wire serve as struts and should be fastened in place by thread as well as cement. The wheels are 1½" in diameter and should be of a heavy type for correct balance.

Tail Assembly

The spars of 3/32" sq. are pinned to the bench and all cross pieces with the exception of F are cemented in place. The edges of 1/16" sq. bamboo are bent to shape by candle flame and glued in position. Cross piece F due to its shape is attached after unit has been removed from the form.

To cover, use separate pieces of tissue for each side of both stabilizer and rudder. Finished covering is lightly sprayed and doped. Navy stripes are painted on the rudder. The fin and stabilizer are silver. The completed units are attached to the fuselage at the designated positions. Brace both stabilizer and rudder with 1/32" sq. bamboo.

Wings

The wings are built in two separate panels. Each panel is supported by a simple strut arrangement and is detachable. The pilot has an unobstructed vision through the glass cabin top.

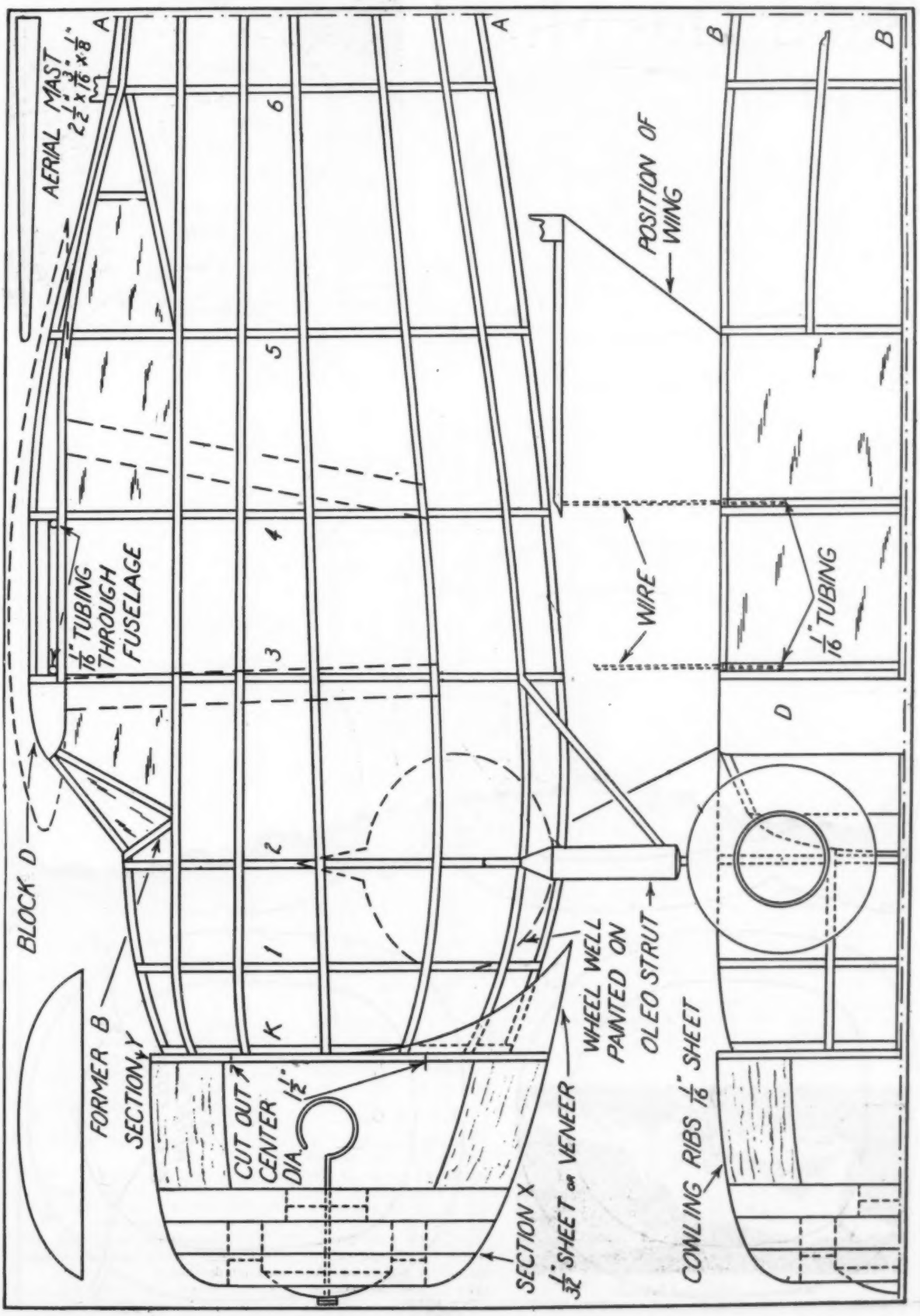
Pin the spars of 1/16" x ⅛" to the bench. Using the rib pattern given, cut all the ribs from a soft sheet of 1/16" balsa. Pin the ribs together. sand until matched and cut notches. Cement the ribs in their proper positions. The leading edge of ⅛" sq. is sanded to shape and inserted in the notches at the front of the ribs. The trailing edge of 1/16" x 3/16" is shaped as shown on the rib pattern and glued in place. The tips are of 1/16" sq. bamboo bent by candle flame. The wing blocks are cut from two pieces of soft balsa 4¼" x 7/16" x 1 3/16". They are shaped as shown in detail, the wide edge being similar to the wing rib and glued to it.

Four pieces of heavy music wire are cut to the lengths given. Two are inserted in each block at the position detailed on the plan.

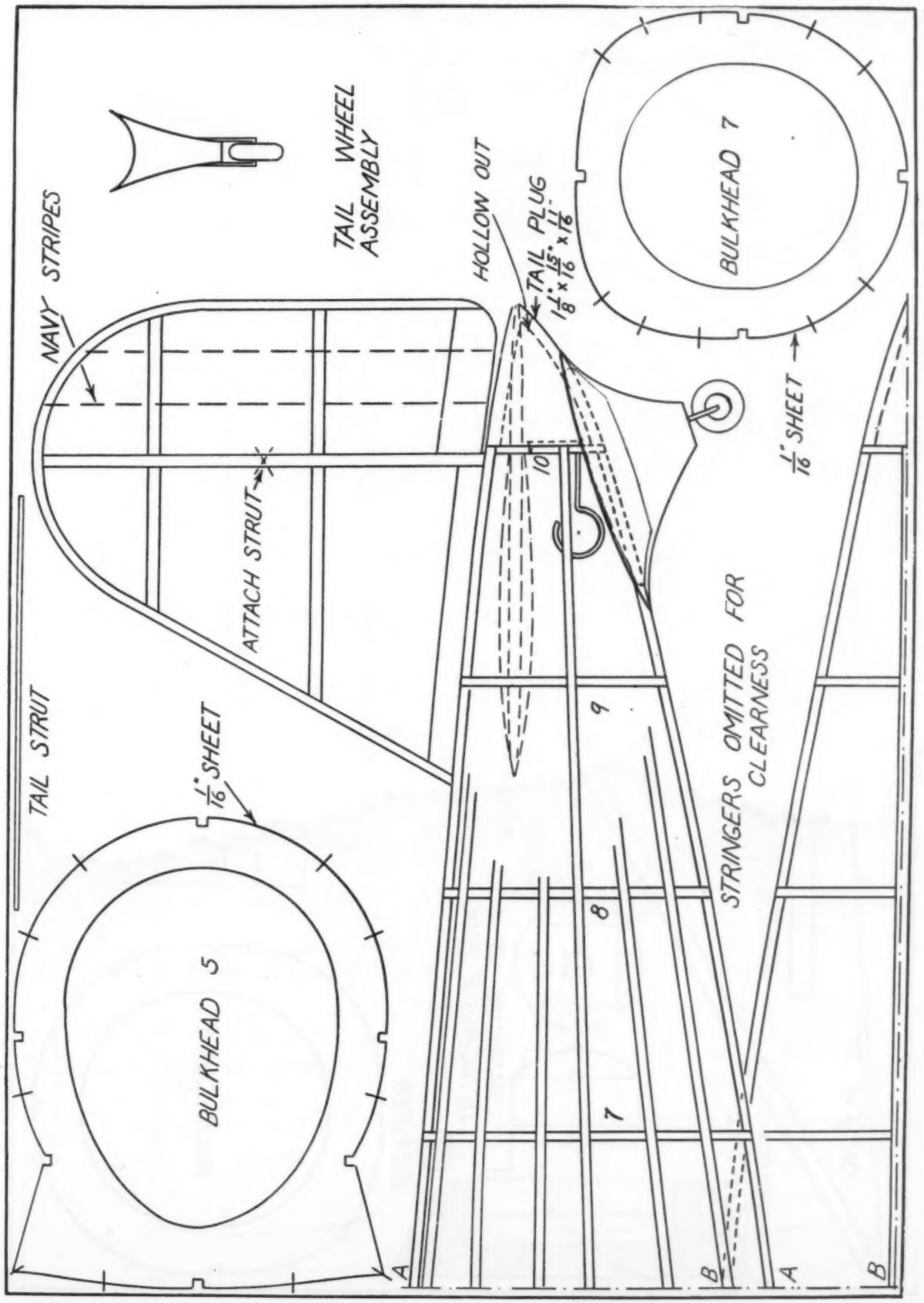
To cover, use separate pieces of tissue for each side of both panels. Apply paper with clear dope and trim the edges. Finished wings are sprayed and doped.

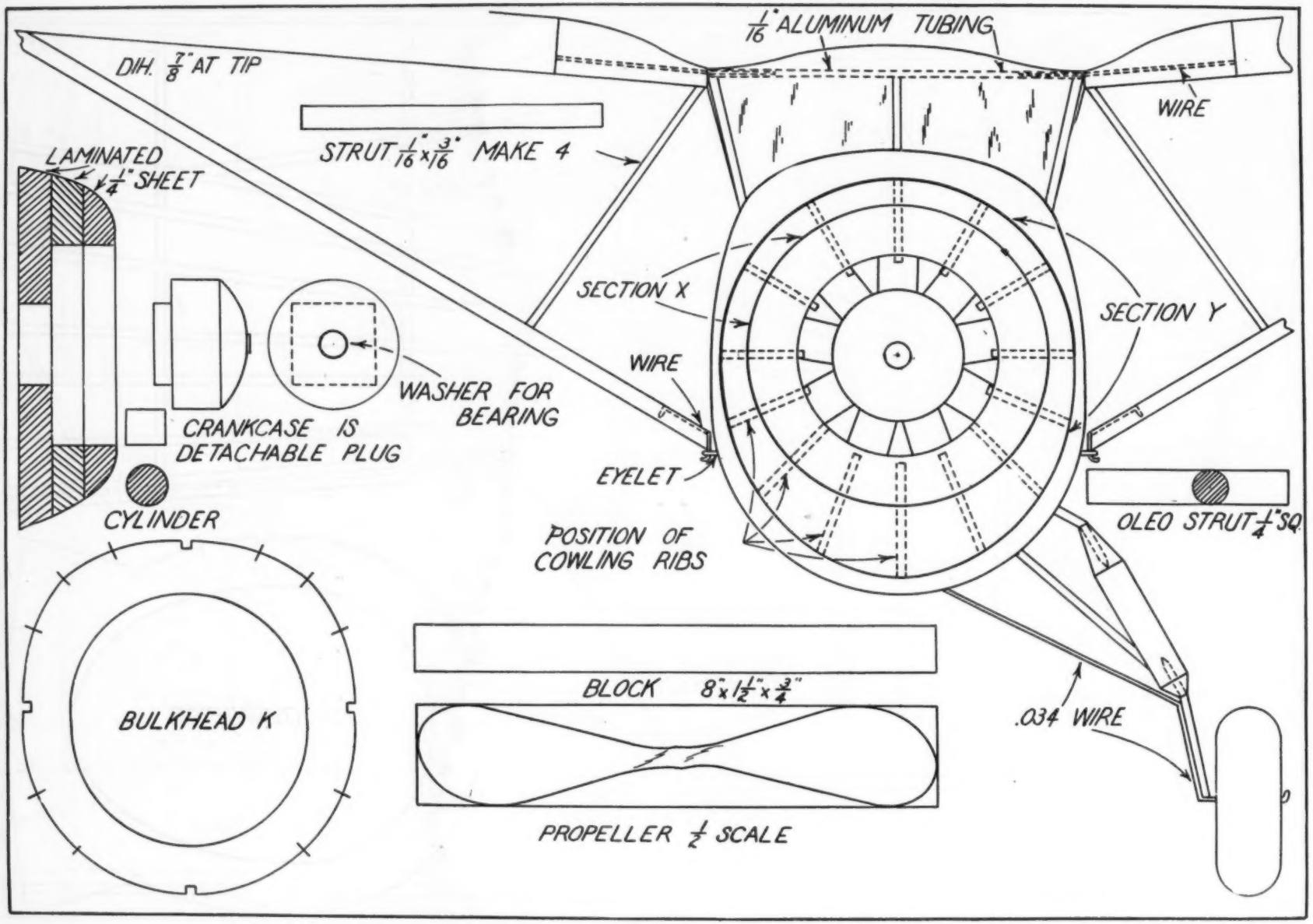
The upper surfaces are yellow and the lower silver. Three inch star insignia are used for decoration.

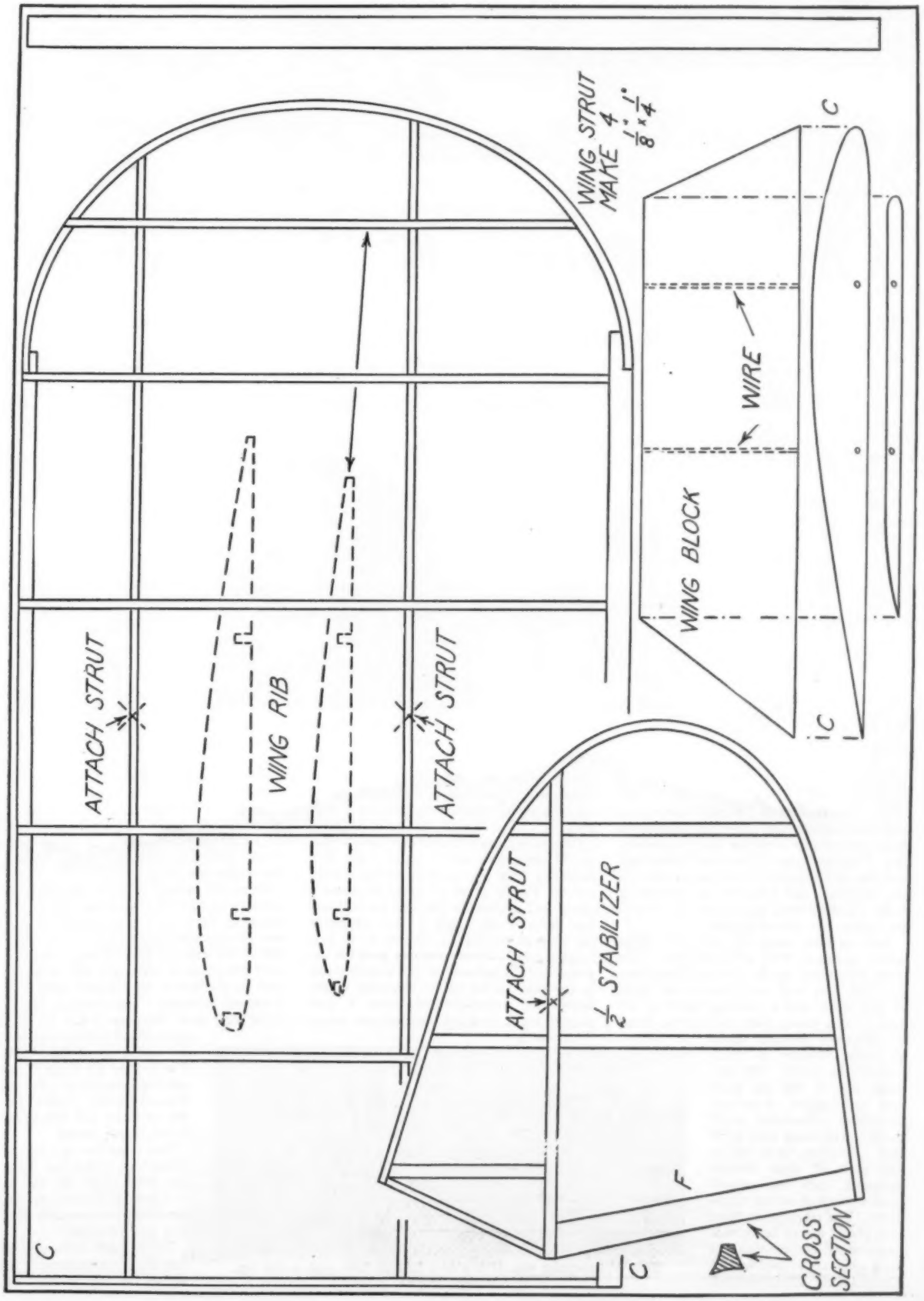
(Continued on page 40)

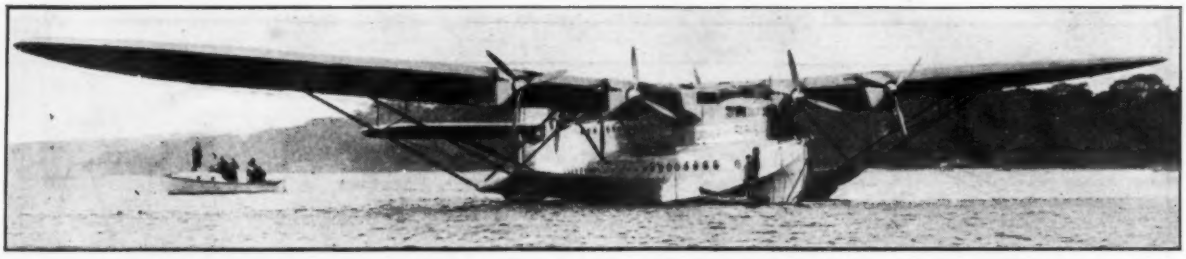

AERIAL MAST 2 1/2" x 1 3/16" x 1/8"
A
A
B
B
6
5
3
2
1
K
D
1/16" TUBING THROUGH FUSELAGE
BLOCK D
FORMER B
SECTION Y
CUT OUT CENTER DIA 1 1/2"
SECTION X
1/32" SHEET on VENEER
WHEEL WELL PAINTED ON
OLEO STRUT
POSITION OF WING
WIRE
1/16" TUBING
COWLING RIBS 1/16" SHEET

4
9
ALL BULKHEADS MADE FROM 1/16" SHEET
10
AUXILIARY STRINGERS DESIGNATED
6
3
ATTACH REAR STRUTS
8
BULKHEADS
1
2
ATTACH OLEO STRUTS


NAVY STRIPES
TAIL WHEEL ASSEMBLY
HOLLOW OUT
TAIL PLUG 1 1/8" x 15/16" x 1"
BULKHEAD 7
1/16" SHEET
ATTACH STRUT
10
9
8
7
STRINGERS OMITTED FOR CLEARNESS
TAIL STRUT
1/16" SHEET
BULKHEAD 5
A
B
A
B


1/16" ALUMINUM TUBING
DIH. 7/8" AT TIP
WIRE
STRUT 1/16 x 3/16" MAKE 4
LAMINATED 1/4" SHEET
SECTION X
SECTION Y
WASHER FOR BEARING
WIRE
CRANKCASE IS DETACHABLE PLUG
EYELET
CYLINDER
POSITION OF COWLING RIBS
OLEO STRUT 1/4" SQ
BULKHEAD K
BLOCK 8" x 1 1/2" x 3/4"
.034 WIRE
PROPELLER 1/2 SCALE


WING STRUT MAKE 4 1" x 1/8" x 1/4"
C
WIRE
WING BLOCK
C
ATTACH STRUT
WING RIB
ATTACH STRUT
ATTACH STRUT
1/2 STABILIZER
F
C
C
CROSS SECTION



The largest seaplane in the world, the "Lieutenant De Vaisseau Paris." It carries eighty-four people

On the Frontiers of Aviation

Latest Developments in All Types of Airplanes—How to Build a Solid Scale Model of the Fairchild Amphibian

By ROBERT C. MORRISON

MR. OTTO TIMM, famed as an airplane builder since 1910, once more comes into the limelight with the announcement that he is soon to place a new high-speed transport on the market. The ship is a twin-engined high-wing monoplane with accommodations for 8-10 passengers.

Specifications of the plane known as the Timm T-800, are as follows:

Span .....53 ft. 7 in.
Length .....39 ft. 9 in.
Height .....14 ft. 0 in.
High speed.....200 m.p.h.
Landing speed (flaps).....
.....56 m.p.h.
Cruising speed.....182 m.p.h.
Initial rate of climb.....
.....1610 ft./mni.
Service ceiling.....24,200 ft.
Cruising range (10 place)
.....740 miles
Cruising range (8 place)
.....945 miles
Wing loading.....18.0 lb. sq. ft.
Power loading.....10.7 lb./hp.

The construction of the plane is conventional throughout and has been designed to keep maintenance costs as low as possible. Mr. Timm designed a low-wing monoplane also but on comparing the characteristics of the high-wing and low-wing, he decided to build the high-wing monoplane because of its higher lift characteristics.

Italy is now about to enter the high-speed transport field with five new low-wing transports similar to our Douglases. At 6,500 feet they will have a top speed of 215 m.p.h. and a cruising speed of 200 m.p.h. The power plant will be two Pratt & Whitney Hornets built in Italy (known as Fiat A-59R's in Italy). The engines are of 800 hp. each and will drive American Hamilton controllable pitch props. The wing span is 80 feet. However, these planes like most all other foreign airplanes, lack the smooth general lines as on our transports. The fuselage on these new planes are of full monocoque metal construction and wing spars are of steel tubing. Controls are fabric-covered.

Here is the latest Stearman U.S. Navy Trainer

Statistics on the new Pioneer Clipper, the Pan-American Sikorsky sister ship to the Brazilian Clipper that is undergoing tests for crossing the Pacific Ocean, are as follows:

Originally designed with accommodations for 32 passengers and a crew of six, this particular boat has been somewhat altered for the Pacific flight in order to allow a substantial increase in gasoline payload and thus increase its range. Such alteration has reduced the plane's capacity to 12 passengers and has increased the gasoline capacity to 2550 gallons. A full compartment in the rear of the cabin, elegantly upholstered and sound-proofed, seats 8 passengers and a forward compartment serves as navigation room and seats four passengers. Between these two compartments are the large additional fuel tanks.

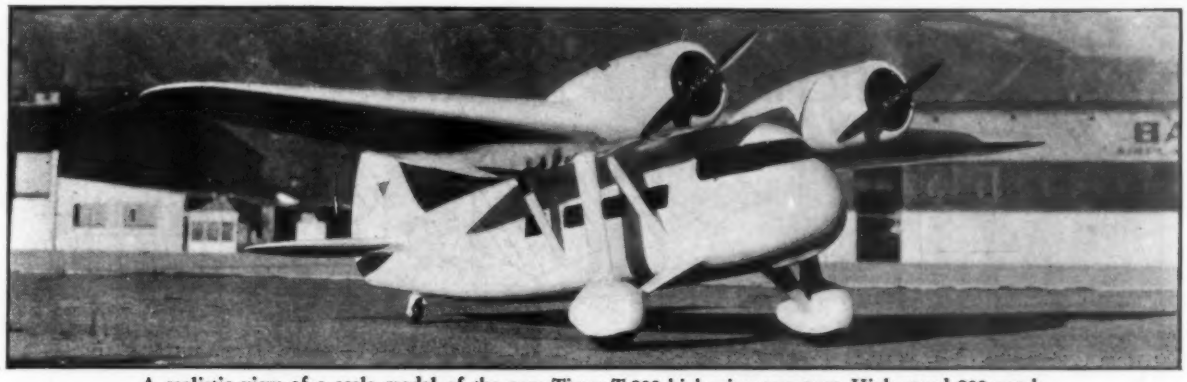
The plane has a gross weight of approximately 18 tons and has a cruising range of 3,100 miles when fully loaded. It has a high-speed of 190 m.p.h. and cruises at 160 m.p.h. With a load of 30,000 pounds, the huge flying boat can take off the water in ten seconds! Geared Pratt & Whitney Hornets, four in number, supply the Sikorsky S-42 with 2800 horsepower. The propellers are three-bladed Hamilton controllable pitch props. The Pioneer Clipper has already added three world records to the ten made by the Brazilian Clipper last year. Pilot Edwin C. Musick who has been testing the plane for several months and who is chief test pilot for Pan-American Airways, won a small Taylor Cub at a raffle not so long ago. It will be quite a diversion flying his brand new Cub around Alameda Airport after making a round trip crossing of the Pacific in one of the giant flying boats of Pan-American Airways.

From the present looks of things it appears as though Pan-American Airways is going to have more competition in their new venture than they had expected. Inter-Island Airways of Hawaii has announced their intentions of starting a line from Hawaii to California to compete with Pan-American Airways. The company has ordered two new Sikorsky S-43s for their inter-island service and have an option on a third S-43. The first of the S-43s is now nearing completion. For the Hawaii-United States line the company will undoubtedly use larger planes.

Pan-American has also ordered four of the new Sikorsky S43s which she will use in China to connect up with the large trans-oceanic Martins and Sikorskys.

TWA, The Lindbergh Line, has also contemplated a line across the Pacific with their

This will surprise you. It is a new Stinson "M" with a 225 hp. Wright engine



A realistic view of a scale model of the new Timm T-800 high-wing transport. High speed 200 m.p.h.

Douglas landplanes. They believe that the landplane is safer for such a flight because of its increased speed over the flying boat, thus lessening the time for hops over water. Of course the Douglases will have to be revamped for the flight and fewer people carried per plane.

TWA now has a Northrop Delta that is being equipped for sub-stratosphere flying such as Wiley Post has been doing. Such a ship as this would be twice as fast as Pan-American Airways boats and would give them some serious competition across the Pacific as far as speed is concerned. An inflated floatation gear would be used on the landplanes in case they should be forced down into the ocean.

Nothing has evolved from the rumors that Boeing is building a larger transport plane at the present time, but if such a plane is being built, United Air Lines would be a likely purchaser. This would give United Air Lines an excuse to enter the Pacific air trade. However they have made no announcement to that effect.

Douglas may also deem it advisable to produce a commercial flying boat of the Martin size at some later date. They are now gaining a great amount of experience with their new Navy "mystery" patrol boat that they are hiding at North Island near San Diego, California. The Douglas Company is located rather near Pan-American's operating base on the west coast. It will have as a competitor the Consolidated Aircraft Corp. who have moved from their Buffalo plant to one in the West and who likewise have completed a new "mystery" patrol boat for the Navy. This particular plane has been down at Norfolk, Va., undergoing tests.

Performance data and specifications of the Fairchild amphibian, three of which were ordered by Pan-American, are as follows:

Capacity	10 place
Engine	Pratt & Whitney Hornet
Horsepower	645 hp.
Span	Span 57 ft.
Length	45 ft. 9 in.
Height	15 ft. 8 in.
Power loading	13.2 lb/hp.
Wing loading	17.9 lb/sq. ft.
Payload	1500 lb.
High speed	186 m.p.h.
Cruising speed	155 m.p.h.
Landing speed	63 m.p.h.
Service ceiling	18,000 ft.
Rate of climb	950 ft/min.
Cruising range	1500 miles

The German Junkers four motor transport G-38, General von Hindenburg. It is one of the largest landplanes in existence

Wing floats are retractable. The hull is all-metal and wing and tail units are also all-metal but fabric-covered.

With the completion of Pan-American Airways' new equipment, it will be far more capable of managing an air line across the Atlantic or Pacific than any other air line in the world. In the Atlantic, P.A.A. will have the new giant French flying boat Latecoere 521 to compete against which should not be much trouble. Though our new Sikorskys and Martins are much smaller than the French plane, they are much more efficient and have a performance that greatly outstrips the Latecoere. However, the French designers had a greater task ahead of them in designing such a large plane and made a great step forward in the development of French aircraft. Following are the specifications of the plane.

Span	161 ft. 9 in.
Length	103 ft. 9 in.
Height	29 ft. 9 in.
Weight empty	43,550 lb.
Payload	15,800 lb.
Disposable load	26,200 lb.
Weight loaded	69,600 lb.
High speed	161 m.p.h.
Cruising speed	137 m.p.h.
Ceiling	16,400 ft.
Range	620 miles
Passenger capacity	70 persons

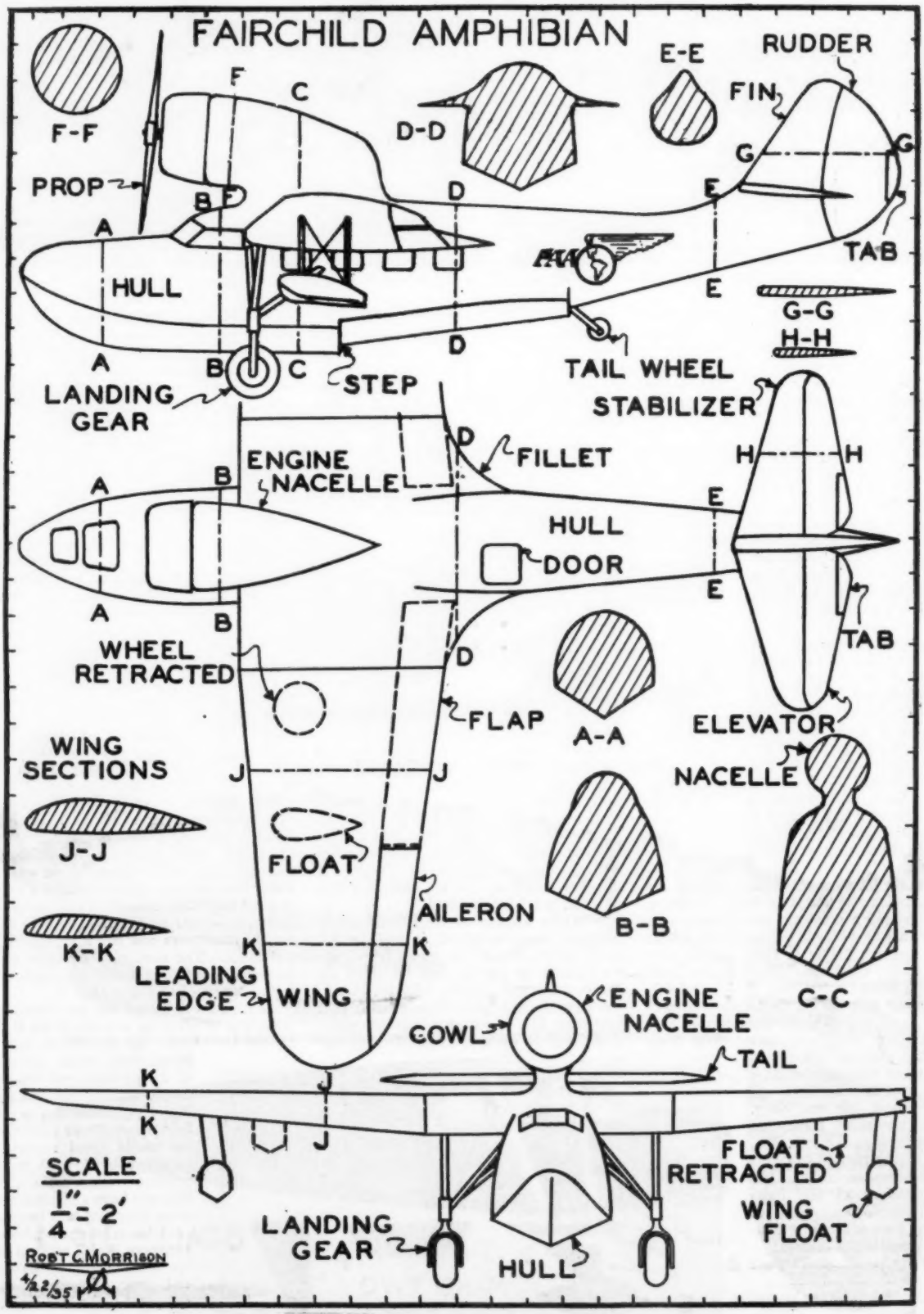
The plane, known as the Lieutenant-de-Vaisseau Paris, has the largest wing-spread of any plane in the world.

The Bellanca Aircraft Corp. has out a new version of their Aircruiser. Its high speed is 165 m.p.h. and cruising speed is 155 m.p.h., which is very high considering that the large plane has only one engine. Other new Bellanca planes includes a twin-engined amphibian somewhat similar to the Bellanca bomber seaplane. The ship carries 18 passengers and has a top speed of 180 m.p.h. The same ship equipped as a land-plane has a top speed of 190 m.p.h. and a cruising speed of 170 m.p.h.

As yet Roscoe Turner has not announced what type of plane he will use in his flight around the world. He expects to take a great circle route, probably at the equator, and will use a twin-engined ship. His new high-speed racer that is now being built for an assault on the world speed record, is expected to do 400 m.p.h. without much trouble. The ship will have a nineteen foot wing span and will be powered by a fourteen-cylinder, twin-row Wasp, rated at 800 hp. at 6,500 feet. With special super-chargers Turner expects to obtain 1,200 hp. from the engine.

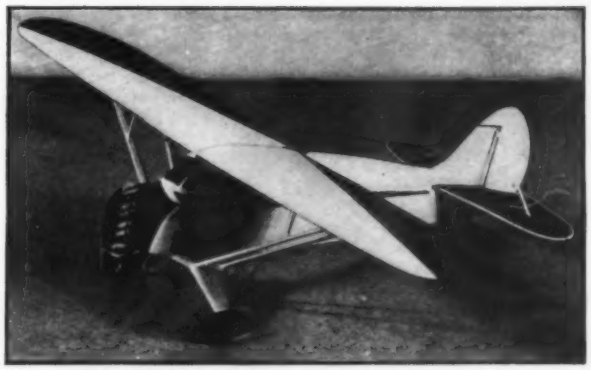
(Continued on page 38)

The Rearwin Speedster for the private owner


FAIRCHILD AMPHIBIAN
F-F
E-E
RUDDER
FIN
D-D
PROP
TAB
HULL
G-G
H-H
LANDING GEAR
STEP
TAIL WHEEL
STABILIZER
ENGINE NACELLE
FILLET
HULL
DOOR
WHEEL RETRACTED
FLAP
A-A
ELEVATOR
WING SECTIONS
NACELLE
J-J
FLOAT
AILERON
B-B
K-K
LEADING EDGE
WING
ENGINE NACELLE
COWL
C-C
TAIL
FLOAT RETRACTED
WING FLOAT
LANDING GEAR
HULL
SCALE
1" / 4 = 2'
ROBT C. MORRISON
4/22/35

A Scale Model for Beginner or Expert

How You Can Build This Flying Scale Glider of the Stinson Reliant—Another Plane for Your Airport



The little ship finished and ready to go places

By JESSE DAVIDSON

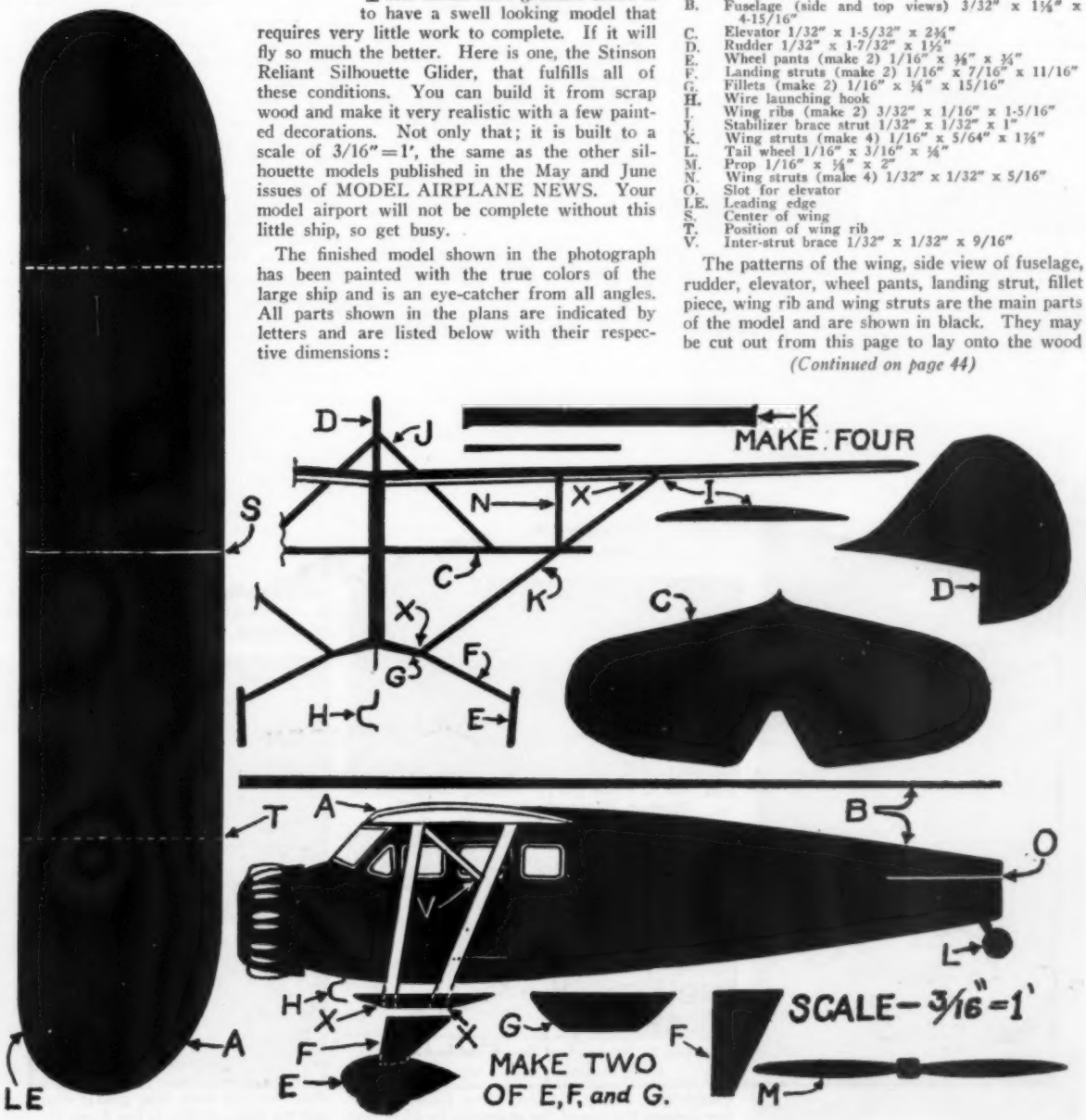
THE model fan's greatest desire is to have a swell looking model that requires very little work to complete. If it will fly so much the better. Here is one, the Stinson Reliant Silhouette Glider, that fulfills all of these conditions. You can build it from scrap wood and make it very realistic with a few painted decorations. Not only that; it is built to a scale of 3/16" = 1', the same as the other silhouette models published in the May and June issues of MODEL AIRPLANE NEWS. Your model airport will not be complete without this little ship, so get busy.

The finished model shown in the photograph has been painted with the true colors of the large ship and is an eye-catcher from all angles. All parts shown in the plans are indicated by letters and are listed below with their respective dimensions:

A. Wing 1/32" x 1-5/16" x 7"
B. Fuselage (side and top views) 3/32" x 1¼" x 4-15/16"
C. Elevator 1/32" x 1-5/32" x 2¼"
D. Rudder 1/32" x 1-7/32" x 1½"
E. Wheel pants (make 2) 1/16" x ⅜" x ¾"
F. Landing struts (make 2) 1/16" x 7/16" x 11/16"
G. Fillets (make 2) 1/16" x ¾" x 15/16"
H. Wire launching hook
I. Wing ribs (make 2) 3/32" x 1/16" x 1-5/16"
J. Stabilizer brace strut 1/32" x 1/32" x 1"
K. Wing struts (make 4) 1/16" x 5/64" x 1⅞"
L. Tail wheel 1/16" x 3/16" x ⅛"
M. Prop 1/16" x ⅛" x 2"
N. Wing struts (make 4) 1/32" x 1/32" x 5/16"
O. Slot for elevator
LE. Leading edge
S. Center of wing
T. Position of wing rib
V. Inter-strut brace 1/32" x 1/32" x 9/16"

The patterns of the wing, side view of fuselage, rudder, elevator, wheel pants, landing strut, fillet piece, wing rib and wing struts are the main parts of the model and are shown in black. They may be cut out from this page to lay onto the wood

(Continued on page 44)

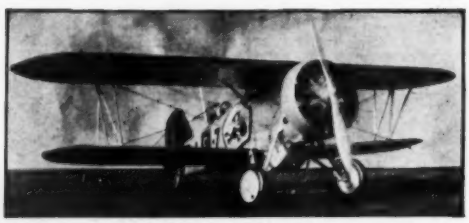


AIR WAYS

HERE AND THERE

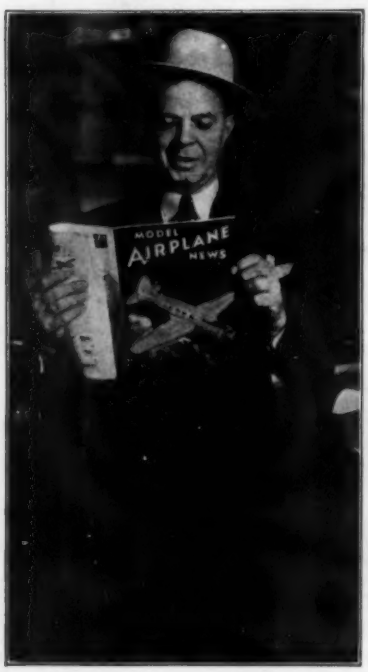
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

The Hawker "Nimrod," fleet version of the "Fury," by Norman Barker



Pict. No. 1. This scale Boeing F4B-4 is complete in detail and has a strip wood fuselage. By J. K. Pietruck

Pict. No. 3. A four foot detail scale model of a Curtiss Page Racer by Robert Deppe



PROBABLY many of our readers have realized for the first time, while reading the article, "Sopwith Airplanes of the War," that the Hawker airplanes are the outgrowth of the old Sopwith ships. It is interesting to compare the modern Hawkers with some of the old "crates" built by the original company in 1913.

Norman Barker of 139 Evans Avenue, Toronto, Ontario, Canada, has dramatically pictured the Hawker "Nimrod" for our heading this month. This ship is the Fleet Air Arm version of the "Fury." It is powered with a supercharged Rolls-Royce "Kestrel" engine. Its flying weight is 3850 pounds and it has a maximum speed of 192½ miles per hour at 13,000 feet. It has an endurance with full throttle of a half hour at ground level and three hours at 13,000 feet.

The picture of the finest scale model plane which we have received this month is picture No. 1. The ship is a Boeing F4B-4 constructed in great detail by John K. Pietruck of 44 East Water Street, Lansford, Pa. The body is made of balsa strips cemented together over bulkheads. After sanding this down a very fine finish has been put over it. This construction accounts largely for the excellent appearance of the model. The whole plane was hand-made, including the wheels, cowling, motor, gas tank, propeller and pilot, who is sporting the luxury of carefully-made celluloid glasses. The machine has been built in great detail; the model itself indicates this. Pietruck wishes us to say that his good friend, David Cairns, is responsible for the photograph of the ship. MODEL AIRPLANE NEWS extends its congratulations on this job.

Irwin G. Ohlsson of 1437 Bellevue Avenue, Los Angeles, Calif., has been a specialist on gas model planes for some time. He is one of the foremost builders of this type of ship in the country. Picture No. 2 illustrates the motor mounting of two of his ships. At the left is one of his old planes, mounting a Brown Junior Motor. At the right is a new development which mounts an engine very much smaller than the Brown. The comparative sizes are well illustrated in the picture. The new engine has a bore of 5/8". It appears that the trend in gasoline motors is to make them smaller and more efficient. Considering the enormous amount of work on a well-built gas job, it can be realized that the smaller the ship, the more ships can be built and the greater the experimental advantage that can be obtained. Those who visit the "Na-

Pict. No. 5. A fine gas job recently completed by Norman Rietmann. It's span is 6' 6"

Pict. No. 6. An original design semi-scale model by Wm. Bates. It is a fine flier

(Left) Pict. No. 9. At last, Hoot Gibson, cowboy aviator has found the magazine he likes best

Pict. No. 10. Bob File, glider champion, and his latest glider. It has flown 4½ min.

Pict. No. 8. A wind tunnel model by Clinton Schmaling

Pict. No. 14. The Associated Model Builders of America

tionals" may have the pleasure of meeting Mr. Ohlsson, for he is usually on hand for such events.

Picture No. 3 shows an XF6C-6 Curtiss Page Racer, built by Robert E. Deppe of 1st Recruit Company, Section 8, Fort Slocum, New York. From the picture one would imagine that it was a full-size ship. It is a model excellently built to a scale of one and a half inches to the foot, giving it a span of forty-seven inches. The details include an electric motor controlled by the throttle and ignition switch in the cockpit. In the picture the propeller is turning over. There is a complete lighting system controlled by the switches in the dashboard. The cockpit itself is fitted with great detail, including miniature instruments, upholstered seat, joystick and rudder bar which control all surfaces. It is a swell job.

Some of our contributors have a sense of the dramatic, as illustrated in picture No. 4, which John Faber, Jr., of 3309 Church Avenue, Brooklyn, New York, snapped of one of his scale models, a Fokker D-7, after it had cracked up in the snow. It looks very much like an aerial view of a real ship, though the wing span is only twenty-four inches. It appears that Faber has a knack of making a virtue out of a misfortune, at least he got a very realistic picture.

The gas model fans are doing exceptionally well in the "East." A good illustration of a well-built ship is shown in picture No. 5. It was constructed by Norman Rietman of the Colony House Hotel, Great Neck, New York. This is Rietman's second job. It has a wing span of six feet, six inches, and is powered with a Brown motor. His first job was quite successful; but as yet, he has not had the opportunity of testing out the ship fully.

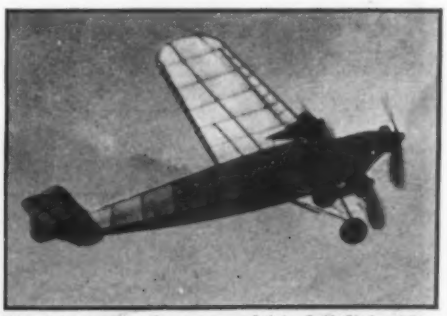
Many of our readers get great pleasure in creating originally designed models; and, after all, there is a great thrill in seeing your own creation, as far as design and construction is concerned, perform in a realistic manner. Picture No. 6 shows an original "brainstorm" of William E. Bates, of 81 Williamson Avenue, Hillside, New Jersey. He calls it the "Space Coursaire" and tells us that is a very excellent flier and unusually stable. If more model builders would create their own designs occasionally, they would find it extremely interesting and instructive. Such work gives a greater understanding of correct distribution of parts to absorb stresses.

One of the most unusual developments in models is illustrated in picture No. 7. It is a miniature engine and mounted in a thirty-five inch model. This is the creation of Don Calkin of 3055 North East Everett, Portland, Oregon. The motor is one of the smallest sucessful motors ever built, yet it is exceedingly reliable. The whole ship with motor ready to fly, weighs only thirteen ounces. The static thrust of the propeller is over ten ounces,

(Continued on page 36)

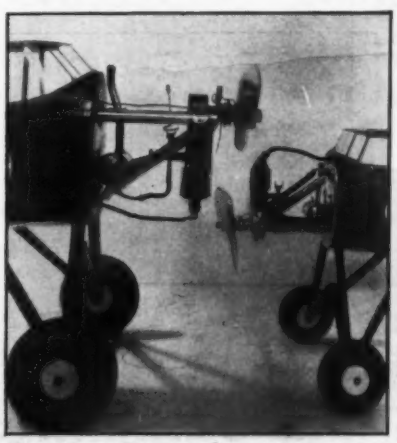
Pict. No. 13. A flying scale Comper Swift which won 2nd place in the Kings Cup Race. By G. Lambert

Pict. No. 12. The Model Air-Club of France at a contest



Pict. No. 11. A tri-motor model in full flight. The Australians know how

Pict. No. 4. Not a real crash. Just John Faber Jr.'s model which cracked up on landing



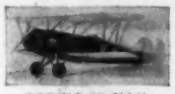
Pict. No. 2. Motors and mountings on two models by I. G. Ohlsson. The small one has a 5/8" bore

Pict. No. 7. One of the smallest gas jobs in existence, span only 35 inches, by Don Calkin

Pict. No. 15. Wm. Sherwood, (right) wins a trophy and a trip to the 1935 Nationals

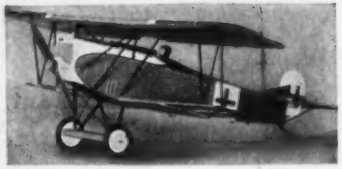
Only 65c *for this authentic* BOEING P-26

Formerly the XP936. Very popular. Much imitated. The most modern pursuit model of a low wing design. Authentically detailed to the tiniest gadget. Span 14⅛", length 12". Suggested coloring: yellow and olive drab. Kit D-23 **65c**



BOEING 95 MAIL

Easy for beginners. Redesigned for beauty and even greater duration than ever before. Span 23 3/16", length 16". Suggested coloring: blue and silver. Kit D-32B. **85c**



FAMOUS WARTIME FOKKER D-7

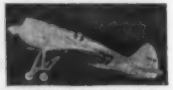
A really authentic steady flying beauty so realistic that it looks as though it was drawn right from the ranks of one of the famous German "Flying Circuses." Wings taper beautifully, new feature control movements (not from cockpit), scale propeller, authentic spandau guns (you make all). Suggested coloring: international orange, green, white, black details. Span 14⅛", length 11¼". Kit No. SF-15B..... **60c**

NAVY CURTISS F11C-2

The plane which needs no introduction as it has already made an excellent name for itself in Navy work. Beautiful flying model. Suggested coloring: the characteristic silver with gray fuselage, green tail surfaces, cowl and other trimmings, and yellow upper wing. Span 15¾", length 10⅝". Kit D-49..... **85c**

All Pictures here are C-D Models

Because all C-D "Dwarfs" are authentic scale models, we are able to use, as you'll notice, the same photographs as in previous ads—for whether the models are ½" or ¾" scale, the finished job in appearance is precisely the same. The photographs could not be told apart.



HOWARD "PETE"

An easy-to-build Air Race model—fine flights. Span 10", length 8⅜". Suggested coloring: all white, black details. Kit D-18B..... **30c**

Save Yourself Packing & Handling Charges

Since C-D "Dwarfs" sell for such a reasonable price, don't content yourself with ordering merely one or two models—order six or more at a time, thereby saving 60c or more on the packing and handling charges, for such really worthwhile bargains in the way of advanced Kits cannot be purchased elsewhere at any price (on orders for less than 6, we require a 10c handling and packing charge per Kit). Always keep a supply handy. Since no liquids are supplied, you may save money by buying larger quantities of cement and paper cement, as well as dopes, or you may use what you have on hand, employing any color you desire for the different ships, for we list only "suggested coloring" in the description of each model.

OHIO CUSTOMERS: Add 3% sales tax (Ohioans only)

Build These Six Thompson Trophy WINNERS!

All six models from 1929 to 1934 (D-2-46-17-27-47-48) only 50c each. Think of it. If you purchase them individually, they cost 10c extra for packing and handling, but if six or more are purchased, no extra charge need be included. Simply send your $3.00 for the six models.

BAYLE'S GEE-BEE

1931 Air Race sensation. Span 11⅜", length 8¼". Suggested coloring: yellow and black. Kit D-17B..... **50c**

TRAVEL AIR MYSTERY

Completely redesigned. Span 14⅛", length 10½". Beautiful solid appearance. Suggested coloring: red, black scalloping, green trim. Kit D-2D..... **50c**

GB SUPERSPORTSTER

Doolittle's 1932 Thompson winner—and a beauty. Fast flights. Span 12⅛" length 9". Suggested coloring: white, red, scalloping. Kit D-27..... **50c**

It took us 16 years to develop these almost unbelieveable VALUES *in authentic flying models*

Never in all model history have modelbuilders been able to buy *so much* for *so little!* Think of it—prices *one-fifth* to *one-half* what you pay for just ordinary models. And you get Kits to make the finest scale flying models ever offered (barring only our ¾" scale line). These new C-D "Dwarfs" (½" scale) are exactly like our ¾" scale flying models in every way except they're smaller and DO NOT CONTAIN LIQUIDS. Say—if you're not building "Dwarfs," you're missing the greatest thrill that ever came into the lives of modelbuilders—and the remarkably low prices enable you to build not just a few, *but lots of 'em!* Start at once—see for yourself why thousands of modelbuilders everywhere are going wild over C-D "Dwarfs"—why dealers all over the country are taking on the entire line. If your dealer hasn't yet stocked the "Dwarfs," and you have to order direct from us, please mention his name and the store he operates (department, model, hardware, sporting goods, etc.) and we'll rush him our Dealer's proposition immediately. See him without further delay.

Get the ones you want TODAY!

(These low prices enable you to buy a number at one time)

U.S. ARMY BOEING P-12E

One of the prettiest of all army fighters. An excellent flying model. Span 15", length 10¼". Suggested coloring: yellow and olive drab, with beautiful red and yellow trimmings. Kit D-8C..... **65c**

CURTISS P6-E ARMY HAWK

Even exhibition models could not outclass this new beauty for external appearance—and she flies very well, too! Suggested coloring: the usual yellow and olive-drab of the Army with the beautiful color marking of the Selfridge Field Squadron of its characteristic black and white; with black lettering and red striped top wing, along with the red, white and blue insignias. The "super" authenticity takes this model out of the model-building class of hobby work into one of almost scientific precision duplicating. Every wire-

HIGH-SPEED FURY

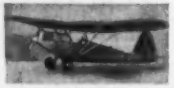
British Hawker interceptor fighter. Now redesigned and beautifully striped top wing and fuse-

each model.

OHIO CUSTOMERS: Add 3% sales tax (Ohioans only)

GREAT LAKES SPORT TRAINER

One of the prettiest models available. Easy to build. Excellent flights. Includes Cleveland's latest features and loads of details. Span 13⅜", length 10¼". Suggested coloring: orange & cream. Kit D-1G..... **65c**



HEATH PARASOL

Span 15½", length 8¼". Suggested coloring: mostly orange, decorative black fuselage side panel. Excellent for beginners, and a duration flyer Kit D-26B..... **35c**

VOUGHT CORSAIR V-65

Make either of the new 2-place Corsairs (V-65 or V-80). Super detailed, extremely realistic. Embodies all new Cleveland features. Span, 18", length 13¼". Suggested coloring: blue, yellow, red, black and silver. Kit D-41..... **85c**

DOUGLAS O-38 OBSERVATION

Very beautiful and unusually well detailed model. Authentic only as "Cleveland" makes 'em! Span 20", length 15¼". Suggested coloring: yellow, olive drab, black details. 2 pilot blocks. Kit D-43..... **85c**

SUPERMARINE S6.B

Greatly improved model of this Schneider Trophy winner, which will R.O.W. Radiators and other unusual features. Span 15", length overall 14½". Suggested coloring: silver and blue. Kit D-19..... **65c**

FOKKER TRIPLANE

Plane of Germany's greatest ace, Von Richthofen. Span 11¾", length 9⅝". Suggested coloring: all red. Kit D-14C..... **45c**

COMPER SWIFT

Redesigned. Excellent flights. Span 12", length 9". Suggested coloring: beautiful green, with black fuselage design. Kit D-33B..... **30c**

LOCKHEED VEGA

A picture for beauty—a wonder for flights. Span 20½", length 14". Suggested coloring: brilliant red and cream. Kit D-21..... **85c**

WACO C-3

Very popular cabin plane. Span 16½", length 12¾". Suggested coloring: silver and red. Kit D-37..... **75c**

Famous '30 LAIRD SOLUTION

It was piloted to victory by the late "Speed" Holman in the Thompson Trophy Classic. Model flies like the Super-Solution—at a fast clip. Suggested coloring: gold wings and tail surfaces, balance black. Span 10⅝", length 9⅛". Order Kit D-46..... **50c**

JIMMIE'S OWN WEDELL-WILLIAMS

This model is a very beautiful and authentic version of the plane Jimmy Wedell himself flew to victory for the 1933 Cup. Capable of excellent speed flights. Suggested coloring: red with black scalloping and bronze motor crankcase, and color separations. Span 10⅝", length 11⅛". Kit D-47..... **50c**

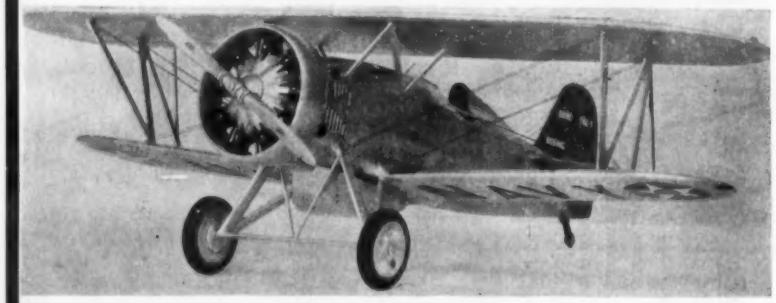
ROSCOE TURNER'S WEDELL-WILLIAMS

Another ship needing no introduction since our beloved Col. Roscoe controls it wherever she goes. The '34 Thompson Trophy winner. Fast flying model. Suggested coloring: Wedell-Williams Gold. Has a span of 13", length 11". Kit D-48..... **50c**

citing in flights. Instantaneous model "hit"! Very easy for beginners. Span 18", length 10⅛". Suggested coloring: Red and silver. Kit D-40..... **60c**

HOWARD RACER "IKE"

Information on this design is supplied both as the four or two wheel "Ike" and the two wheeled "Mike." Flies and climbs beautifully. Span 10⅛", length 8½". Suggested coloring: white with black details, lettering. Kit D-42, only..... **25c**



Only 65c for this super-detailed

NAVY BOEING F4B-3

Beautiful flying miniature of the masterful fighter now used by the Navy. Exciting to build—thrilling to fly. Capable of fairly long flights. Span 15", length 10¼". Suggested coloring: silver, yellow and red. Kit D-29 **65c**

MONOCOUPE

Span 16", length 10¼". Suggested coloring: Beautiful cream and orange. This design has won many first prizes for model-builders. Kit D-28B..... **45c**

A-W QUAD FIGHTER

Very popular Steady flyer. Now authentic rib spacing. Easy to build. Span 14", length 12¾". Suggested coloring: red, white and blue. Kit D-11..... **45c**

LINCOLN SPORT

A lightplane sensation. Beginner's model. Span 10", length 8 1/16". Suggested coloring: cream, black trim. Kit D-36..... **25c**

ADD 10c

per kit (packing-handling) to these prices —if ordering less than six.

All models pictured here also available in 3-4" scale C-D's

They are the famous super-complete Kits containing wood entirely printed out, all dopes, cements, tissue, wire, washers, turned wheels and necessary turned parts, fibre propeller blades, hubs, etc., etc. Moreover, there are 21 other models in addition to those pictured here.

Send 5c for complete catalog showing entire line

Model Builders!

If your dealer can't supply you—order direct. (Ohioans—add 3% sales tax). We offer lightning delivery service—but we urge you first to go to your dealer, as more and more dealers are putting in a complete line of the C-D "Dwarfs"—or, why not get your dealer to do so, if he still does not stock them. If ordering direct, please mention his name and address, so we can write him. Above all—*send 5c at once for a complete Catalog of C-D "Dwarfs," and our standard ¾" scale line of 50 models, and C-D supplies.* Do it NOW!

WHAT 10 NEW DESIGNS WOULD YOU LIKE TO SEE "CLEVELAND" DESIGN?

Be Sure to Read Instructions Below Before Ordering

IF ORDERING DIRECT—add 10c per Kit for packing and handling charge. We always pay postage ANYWHERE. If half dozen or more are ordered at one time, there is no packing or handling charge. No C.O.D.'s—send check, or money order—cash at your own risk. Shipments *ALWAYS* rushed. To Canada, Mexico and British Isles, add 10% to above prices; other foreign countries, add 20%.

CLEVELAND

MODEL & SUPPLY CO. INC. 1866NG West 57th St., CLEVELAND, OHIO, U.S.A

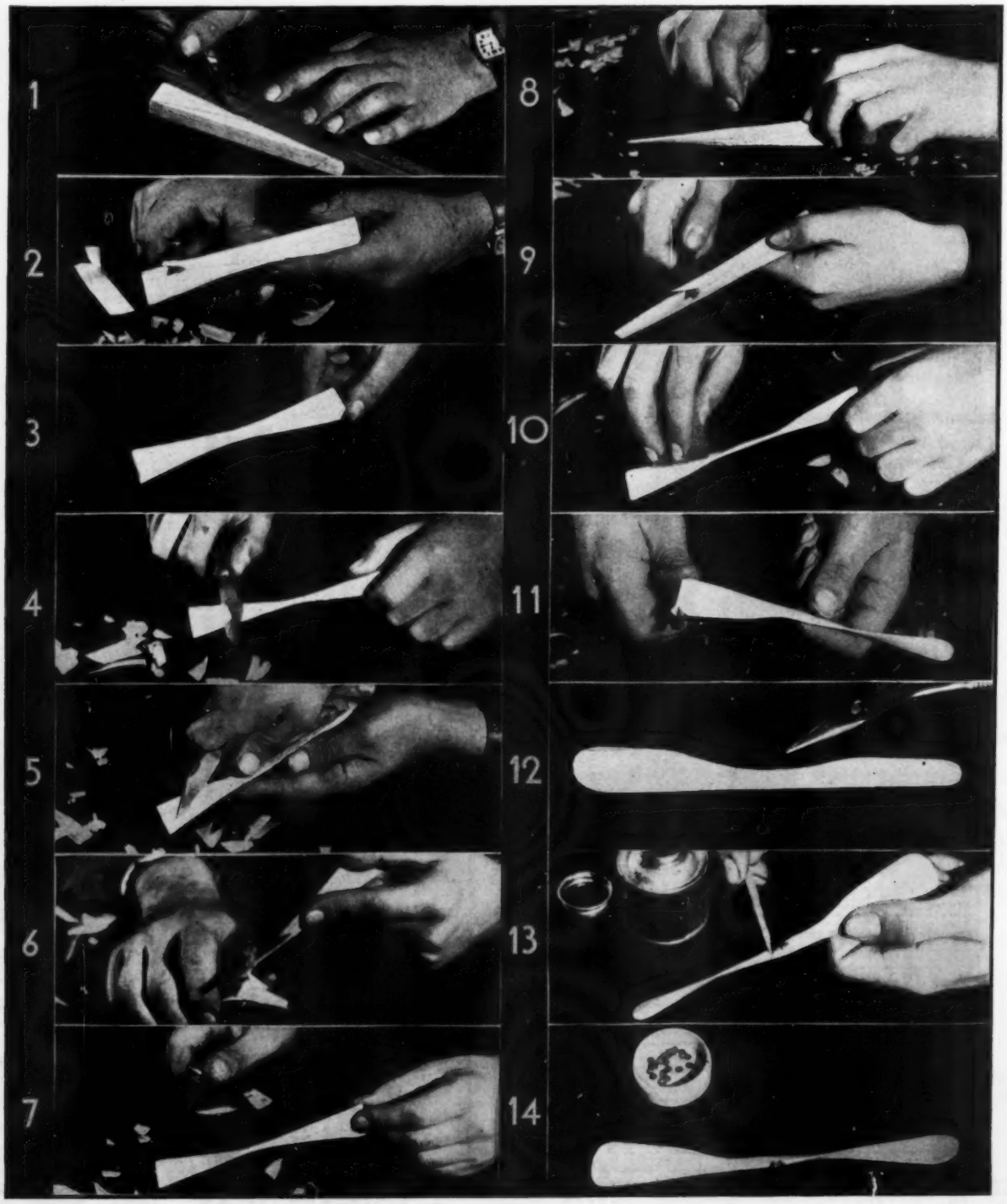
DEALERS! CLUBS!

Repeat orders from model airplane departments, dealers and clubs are pouring in. Here's the fastest-moving model setup yet offered If you're not already selling these new low priced C-D "Dwarfs" (½" scales) and the standard ¾" scales, write or wire immediately for full details. You'll be excitingly surprised at the profitable business you'll get when handling America's most popular model line—the "CLEVELAND" line.

The Evolution of a Propeller

THE graphic description given below of how to carve a propeller, should prove of great value to beginners who have found it difficult to make this important part of the model plane. Operations:

(1) Drawing diagonal lines on block.
(2) Cutting block to form of blank.
(3) The finished blank.
(4) Starting to carve the blank.
(5) Carving the concave side of blade.
(6) Carving the convex side of blade.
(7) The rough propeller.
(8) Making propeller shaft hole with pin.
(9) Cutting down the hub.
(10) Sandpapering the propeller.
(11) Rounding the propeller tips.
(12) The bent propeller shaft in place.
(13) Cementing in the propeller shaft.
(14) The finished pusher propeller.



The Aerodynamic Design of the Model Plane

ARTICLE No. 41 — CHAPTER No. 4

Torque and Work Delivered by Rubber Motors and How Their Values Change With the Number of Rubber Strands Used

By CHARLES HAMPSON GRANT

IN THE preceding installment of this series of articles the *significance* of the number of turns, the maximum torque and the amount of work that could be stored in a rubber motor were explained in terms of performance. Tables were given showing the number of turns that could be stored per inch of motor, in motors composed of various sizes and numbers of strands. In order that you may be able to estimate completely the performance of your models in light of these facts, tables are given below which also show the maximum torque developed and the amount of work that can be stored in various motors.

It is of great help in model designing to have an understanding of how the possible turns, torque and work varies with different numbers and sizes of strands used in motors. Suppose, therefore, that we carefully consider the formulae and tables and determine the character of these variations.

The formulae for turns indicate that the number of turns that it is possible to store in a motor of given length and size of strands, is inversely proportional approximately to the square root of the number of strands. Expressed mathematically, the turns per length of motor (T) are equal to $\sqrt{\frac{K}{N}}$, where (K) is a constant used to make the formulae numerically correct and (N) represents the number of strands used in the motor.

Translated into simple terms, this means that if a motor of *one* strand will absorb 100 turns, a motor of *two* strands (twice as many) will give *two-thirds* as many turns approximately, or about 67 turns. Note that a motor of *twice* the number of strands will not give *one-half* the number of turns as many model fans erroneously assume. An examination of the tables on page 19 of the June issue of MODEL AIRPLANE NEWS will verify this fact. You will find that this relationship will not be exact for the size of the strands; the amount of lubricant used and the method of winding have a minor effect upon it. However, the variation from this definite mathematical relationship is small and does not justify that consideration of this relationship be discarded. It is of great importance in the general estimation of model performances, and demonstrates that definite mathematical laws govern results obtained.

If a specific case is considered, using the figures given in the table, for example, the case of *3/32" x 1/30" lubricated and stretched brown rubber*, we note that 104 turns can be stored per inch of motor in a *two* strand motor and 73.1 turns can be stored per inch of motor in a *four* strand motor. This ratio is about 100 to 70. This relationship is very close to the theoretical one of 100 to 67. Further checking of values will show approximately the same results.

When the term "number of strands" is used here it is considered that all of the strands are of the same cross section area, and this reference acts as a convenient way of designating the relative cross section areas of various motors. The important point in considering turns, torque and work is the motor cross section area. For instance, if a motor of four strands has a cross section area of 1/100 square inches, then a motor of eight strands will have a cross section area of twice as much, or 2/100 square inches.

Torque Relationships

Now let us consider how the torque changes with the use of various numbers of strands (or motor cross section areas). The formulae for the maximum torque are all derived from the basic formulae of $Q\ max = K_1 (\sqrt{N^2 + K_2})$, where Q max is the maximum torque generated, K_1 and K_2 are numerical constants and N represents the number of strands in the motor. The formula shows how the maximum torque varies with a change in the number of strands or cross section area of the motor. In general terms the formula indicates that the maximum torque varies approximately as the square root of (N) cubed, or as (N) times the square root of (N), mathematically expressed, $N\sqrt{KN}$, (K) being a numerical constant for any particular condition.

(Continued on page 45)

BLACK RUBBER
MAX. TORQUE IN INCH OUNCES

STRAND SIZE →		1/8" x 1/30"		3/32" x 1/30"
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D
2	1.44	1.15	2.756	1.39
4	3.36	3.013	5.715	3.60
6	5.61	5.37	10.59	6.38
8	8.12	8.13	16.39	9.60
10	11.81	11.20	22.98	13.19

BLACK RUBBER MOTORS
WORK DELIVERED IN INCH OUNCES

STRAND SIZE →		1/8" x 1/30"		3/32" x 1/30"
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D
2	210	237.5	407.5	355
4	355	382.5	747.5	580
6	500	527.5	1087.5	805
8	645	672.5	1427.5	1030
10	790	817.5	1767.5	1255

MAX. TORQUE IN INCH OUNCES — BLACK RUBBER

STRAND SIZE →		1/16" x 1/30"		STRAND SIZE →	1/32" x 1/30"	
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D
2	0.473	0.446	0.6235	0.2276	0.2028	0.203
4	1.151	1.031	2.062	0.4960	0.4646	0.6546
6	1.97	1.710	4.06	0.7915	0.766	1.276
8	2.94	2.523	6.50	1.109	1.100	2.330
10	3.93	3.28	9.33	1.445	1.461	2.904

BLACK RUBBER MOTORS — WORK DELIVERED IN INCH OUNCES

STRAND SIZE →		1/16" x 1/30"		STRAND SIZE →	1/32" x 1/30"	
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D
2	127.5	125	160	57.5	57.5	38.5
4	180.0	185	368	93.5	93.5	84.5
6	232.5	245	575	129.5	129.5	130.5
8	285.0	305	783	165.5	165.5	176.5
10	337.5	365	991	201.5	201.5	222.5

MAX. TORQUE IN INCH OUNCES — BROWN RUBBER

STRAND SIZE →		1/8" x 1/30"		3/32" x 1/30"	1/16" x 1/30"	1/32" x 1/30"
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D
2	1.005	1.203	1.70	1.231	0.801	0.441
4	2.678	3.21	4.80	3.29	2.09	1.071
6	4.79	5.74	8.02	5.89	3.70	1.827
8	7.24	8.59	13.5	8.93	5.57	2.660
10	10.01	12.01	19.0	12.31	7.66	3.625

BROWN RUBBER MOTORS — WORK DELIVERED IN INCH OUNCES

STRAND SIZE →		1/8" x 1/30"		3/32" x 1/30"	1/16" x 1/30"	1/32" x 1/30"
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D
2	150	262.5	337.5	287.5	225	100
4	325	467.5	762.5	537.5	405	195
6	500	673.0	1187.5	787.5	585	290
8	675	878.0	1612.5	1037.5	765	385
10	850	1082.0	2037.5	1287.5	945	480

NATIONAL AERONAUTIC ASSOCIATION
JUNIOR MEMBERSHIP NEWS

Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

Get Your Model Planes Ready Now for the National Championship Meet
New Records and New Champions Likely at St. Louis June 27-29

The latest international contest model built by Frank Zaic, New York.

Last Call for 1935 National Championship Meet

IF you have not already requested entry blanks and full information about the 1935 National Championship Model Airplane Meet, you should do this without delay. The meet takes place in St. Louis, Missouri, June 27-29 and entries close on June 20. So you have none too much time. Last month on these pages you were given many of the details of the meet and more complete information will be sent on request. Just write to the Model Airplane Contest Director, Stix Baer and Fuller Co., St. Louis, Missouri. Be sure to enclose in your letter a large stamped and addressed envelope.

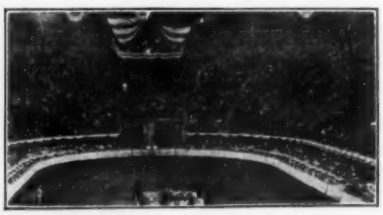
The 1935 meet is sanctioned by the National Aeronautic Association. All of the N.A.A. model plane trophies are up for competition and other attractive prizes are being offered. The sponsors of the meet are the St. Louis Junior N.A.A. Chapter and Stix Baer and Fuller Company. The best of conditions have been provided for model flying. Reasonable hotel rates at the Statler are assured. A wide variety of entertainment features will insure your having a wonderful time in St. Louis. So don't delay in forwarding your entry blanks before June 20 and above all, come to St. Louis ready to offer the stiffest sort of competition to the hundreds of model plane flyers from all parts of the country. All the present champions are expected and they promise to make every effort to retain their championships.

PURPOSE, SPIRIT AND
MEANING OF N.A.A.

"AMERICA MUST LEAD IN THE AIR." This emphatic declaration embodies the purpose and spirit of the National Aeronautic Association. It is inspired neither by narrow nationalistic view nor by boastful challenge. It expresses a determination to encourage generous rivalry between all nations in the wide field of aviation. But American genius, skill and courage must take and maintain the lead in the great adventures which further subjugation of space invites.

America must show that she is not a laggard in this momentous era of aviation development. Our purpose can be achieved through the cooperation and support of every progressive element of the industry and through the aid of every valiant explorer in the field of research. With their loyal adhesion and with reasonable encouragement from a visionful Government, America's flag can lead American enterprise into new conquests in the limitless field opened to it by the genius of the Wrights, and already explored in commendable measure by the indomitable courage and resourcefulness of those who have brought the aviation industry to its present high state of efficiency and service.

WILLIAM G. McADOO



Interior of huge St. Louis Arena.

Lyndhurst Outdoor Meet

THIRTY-SEVEN gasoline models were on hand at Teterboro Airport, Saturday, April 27th, to compete in the Lyndhurst, N.J., High School Model Aircraft Club's meet. There were also ninety-five rubber powered entrants. Some excellent flights were made and new records established.

The meet was promoted and run by members of the L.H.S.M.A.C. assisted by the two older brothers of the Club President, Francis Tlush. The N.A.A. sanctioned the meet and gave official supervision. Prizes were cups, trophies, medals, a wrist watch, and construction kits. Most of these awards were provided by the club. One cup was offered by Mr. E. A. Walen of Springfield, Mass. The construction kits were given by the Berkeley Model Supply Co.

Summary: Gasoline Models.

1st, Fred Price, Newark, N.J., 22m 15.8s.

2nd, Alphonse Bellantonio, Brooklyn, N.Y., 18m 50s.

3rd, Frank Gerstenmeier, Newark, N.J., 14m 21s.

Ray Podolsky, St. Louis, warming up his gas model for the 1935 National Championship Texaco Contest

NATIONAL AERONAUTIC ASSOCIATION OF U.S.A.
DUPONT CIRCLE
WASHINGTON, D.C.

I hereby make application for membership in the National Aeronautic Association as a Junior Member. I am under twenty-one years of age.
I enclose fifty cents for initiation fee and first annual dues (Use check or money order.)

Name .....
(Please print or type)

Street .....

City ..... State .....

Date of Birth.....
(Month, Day, Year)

Approved .....
(Parent sign here, if applicant is under eighteen)

Aerial view of St. Louis Arena where indoor flying will be held.

4th, John Re, Franklin Square, N.Y., 9m 28s.

5th, Ludwig Bielko, Newark, N.J., 8m 43s.

6th, Allen Turner, Brooklyn, N.Y., 4m 46s.

7th, Gerard Smith, Brooklyn, N.Y., 2m 57s.

8th, Joe Kovel, Brooklyn, N.Y., 2m 15s.

Rubber Powered Models.

1st, Henry Struck, Jackson Heights, N.Y., 4m 30s.

2nd, August Ruggeri, New York City, 3m 08.6s.

3rd, David B. Hecht, New York City, 2m 36.5s.

4th, Martin Faynor, Newark, N.J., 2m 33s.

5th, Alton DuFlon, Ridgefield, N.J., 2m 25.8s.

6th, Salvatore Ippolito, New York City, 2m 24.7s.

7th, Anthony Liccese, Newark, N.J., 2m 18.5s.

8th, William Ying, Staten Island, N.Y., 2m 11s.

9th, Frank Zaic, New York City, 2m 08s.

10th, Henry Hohner, Newark, N.J., 2m 06s.

Lakehurst Indoor Meet

ON Saturday, May 4th, a successful indoor meet was held at Lakehurst Naval Air Station in the large dirigible hangar. Those attending came from points between Springfield, Mass., and Atlantic City, N.J. Air conditions were far from perfect, yet several new records were made.

Results:

Baby R.O.G. (Class A Stick Model)
William Latour, 8m 48s.

Class B Stick Model, R.O.G.
Bruce Mackler, 10m 22s.
Jesse Bieberman, 9m 53.4s.
William Latour, 9m 31.2s.

Class B Stick Model, Hand-launched.
Robert Jacobson, 16m 11s.
Isaac Manulkin, 10m 59.4s.
Jesse Jessen, 10m 21s.

Class C Stick Model, Hand-launched.
Ernest A. Walen, 18m 55.8s.
Jesse Jessen, 15m 13.6s.
John Haw, 10m 57.4s.

Class B Fuselage Model.
Robert Jacobson, 10m 44s.
Daniel Clini, 9m 21s.

Class C Fuselage Model.
George Aspiotis, 13m 14.4s.
William Latour, 12m 31.8s.
John Haw, 9m 53s.

OFFICIAL MODEL AIRPLANE RECORDS

Approved by Contest Board of the N.A.A.
Through May 10, 1935

INDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS B

Junior: Robert Jacobson	Philadelphia, Pa.	16m 11s
Senior: Ralph Kummer	St. Louis, Mo.	17m 49.8s
Open: Michael Lichstein	Philadelphia, Pa.	14m 45.8s

CLASS C

Junior: John Stokes	Huntingdon Valley, Pa.	18m 53.4s
Senior: "Pete" Andrews	Philadelphia, Pa.	20m 22.8s
Open: Carl Goldberg	Madison, Wis.	22m 59.4s

STICK MODEL AIRPLANES, R.O.G.

CLASS A

Junior: Joseph Pruss	Philadelphia, Pa.	10m 25s
Senior: Merrell Malley	Atlantic City, N. J.	10m 56.4s
Open: William Latour	Philadelphia, Pa.	8m 48s

CLASS B

Junior: Bruce Mackler	Atlantic City, N. J.	10m 22s
Senior: William Latour	Philadelphia, Pa.	14m 40.2s
Open: Michael Lichstein	Philadelphia, Pa.	11m 06s

STICK MODEL AIRPLANES, R.O.W.

CLASS A

Junior: William Wert	Philadelphia, Pa.	3m 46s
Senior: Paul Karnow	Philadelphia, Pa.	5m 01.4s

CLASS B

Junior: James Mooney	Philadelphia, Pa.	8m 37.6s
Senior: Mayhew Webster	Philadelphia, Pa.	11m 55s

GLIDERS, Hand-launched

CLASS A

Junior: Kenneth Nelson	Boston, Mass.	26.6s
Senior: David B. Hecht	New York City	34.4s

CLASS B

Junior: Louis Young	Boston, Mass.	27s
Senior: David B. Hecht	New York City	31.6s

CLASS C

Junior: Stanley Congdon	Glen Ridge, N.J.	17s

AUTOGIROS

Junior: Raymond Steinbacher	Ridgefield, N.J.	57.2s
Senior: Alton H. DuFlon, Jr.	Ridgefield, N.J.	2m 01.2s

FUSELAGE MODELS, R.O.G.

CLASS B

Junior: Robert Jacobson	Philadelphia, Pa.	10m 44s
Senior: Herbert Greenberg	Newark, N.J.	12m 23.5s
Open: William Latour	Philadelphia, Pa.	6m 48s

CLASS C

Junior: Hyman Oslick	Philadelphia, Pa.	12m 59.4s
Senior: Emmanuel Enderlein	Philadelphia, Pa.	13m 24s
Open: William Latour	Philadelphia, Pa.	12m 31.8s

FUSELAGE MODELS, R.O.W.

CLASS B

Junior: John Stokes	Huntingdon Valley, Pa.	3m 23s
Senior: Bruno Marchi	Boston, Mass.	3m 11s
Open: William Latour	Philadelphia, Pa.	5m 42s

OUTDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS C

Junior: Bruno D'Angelo	Philadelphia, Pa.	8m 29.4s
Senior: Vernon Boehle	Indianapolis, Ind.	15m 00s
Open: Bernard Collins	Providence, R. I.	3m 23s

CLASS D

Junior: Fred Skafec	Akron, Ohio	8m 21.6s
Senior: Ralph Kummer	St. Louis, Mo.	20m 54s
Open: Michael Marco	Springfield, Mass.	1m 52s

GLIDERS, Tow-launched

CLASS C

Senior: Bob File	Columbus, Ohio	23m 13s

CLASS D

Junior: Stanley Congdon	Glen Ridge, N. J.	45.2s
Senior: Fred Korn	New York City	1m 16.2s

AUTOGIROS

Senior: Ralph Kummer	St. Louis, Mo.	2m 06s

FUSELAGE MODELS, R.O.G.

CLASS C

Junior: Donald Mertens	Erie, Pa.	1m 44s
Senior: Russell Yungbluth	St. Louis, Mo.	11m 35s
Open: Bernard Collins	Providence, R. I.	2m 56s

CLASS D

Junior: William Ying	Staten Island, N. Y.	1m 50.5s
Senior: Vernon Boehle	Indianapolis, Ind.	8m 43s
Open: Michael Lichstein	Philadelphia, Pa.	1m 28s

CLASS E (Gasoline Engine)

Senior: Maxwell Bassett	Philadelphia, Pa.	21m 57s
Open: Carl V. Carlson	Chicago, Ill.	6m 48.5s

NATIONAL AERONAUTIC ASSOCIATION

Model Aircraft Definitions and Competition Rules

DEFINITIONS AND CLASSIFICATIONS

Adopted April 15, 1935

All models are classed as follows:

CLASS A—A model is in class A when the area of its effective main supporting surfaces does not exceed 30 square inches.

CLASS B—when the area exceeds 30 but is not over 100 square inches.

CLASS C—when the area exceeds 100 but is not over 150 square inches.

CLASS D—when the area exceeds 150 but is not over 300 square inches.

CLASS E—when the area exceeds 300 square inches.

RISE OFF THE GROUND (R.O.G.)—A model airplane of the R.O.G. type has landing gear that permits it to take off from the ground or floor starting from a standstill under its own power. The landing gear must be strong enough to support the model while taking off and landing, and its usefulness must be demonstrated by gliding the model from a height of at least four feet, landing without damage and without nosing over. The wheels shall turn freely and be of such size and strength as to permit the model to taxi freely on an ordinary platform. The minimum diameter of the wheels shall be not less than the following:

Class A—½ inch Class D—1½ inches
Class B—¾ inch Class E—2 inches
Class C—1 inch

RISE OFF WATER (R.O.W.)—A model airplane of the R.O.W. type can take off from or alight on water. It must demonstrate its seaworthiness by floating five seconds. All surfaces and parts other than floats must be above the water and model must float unassisted. It must take off from the water starting from a standstill under its own power.

AMPHIBIAN—A model airplane of the amphibian type has the combined characteristics of the R.O.G. and R.O.W. types, fulfilling these specifications without substituting landing gear. The model's time shall be the average of two flights, respectively, the best one of three R.O.G. flights and the best one of three R.O.W. flights.

HAND-LAUNCHED—A model airplane is hand-launched when it is released into flight directly from the hands of the launcher. The model shall be launched from an elevation of not more than six feet above the ground or floor.

GLIDER—A model glider is similar to a model airplane but without power plant. It may be launched in two ways: (1) hand-launched; (2) Tow-line launched. Hand-launching is defined above. Tow-line launching is accomplished by pulling the glider into the air with a string from the ground like a kite. The tow-line shall be no longer than 100 feet and shall be released from the model by the launcher. The flight time begins when the tow-line is released. Model gliders need have no landing gear but shall conform to the weight classifications of model airplanes.

PUSHER—A model airplane of the pusher type has its propeller or propellers behind the main supporting surfaces.

TRACTOR—A model airplane of the tractor type has its propeller or propellers forward of the main supporting surfaces.

TRACTOR-PUSHER—A model airplane of the tractor-pusher type has one or more propellers forward of, and one or more propellers behind the main supporting surfaces.

INDOOR MODEL—A model of the indoor type is designed primarily to fly indoors. The area of the effective main supporting surfaces shall not exceed 150 square inches.

OUTDOOR MODEL—A model of the outdoor type is designed primarily to fly outdoors. The area of the effective main supporting surfaces shall be no less than 100 square inches. Outdoor models shall weigh, complete and ready to fly, not less than one ounce avoirdupois for each 50 square inches of effective wing area. If ballast is used to bring model up to the required weight, it shall be securely attached so as to prevent its being dropped in flight.

STICK MODEL—A model of the stick type has a body composed of a single stick or open framework, rather than a fuselage. Models using tubes to enclose the motors, and those that do not meet the fuselage type requirements are classed as stick models.

FUSELAGE MODEL—A model of the fuselage type has a built-up, enclosed fuselage. The minimum area of the maximum cross-section of the fuselage must correspond to the formula $\frac{L^2}{100}$ where "L" equals the over-all length of the model, excluding the propeller. The fuselage shall be of streamline form and have not less than 90 per cent of its surface area covered. Outriggers and booms may be used on fuselage type models. The fuselage shall be a structure which supports the motor, wings, empennage and landing gear. When rubber is used for motive power, it shall be contained entirely within the model.

FLYING SCALE MODEL—A flying scale model is an exact replica of a man-carrying machine, every part being proportional in size to the corresponding part of the large machine. The N.A.A. does not recognize for flight records the Flying Scale Model.

EXHIBITION SCALE MODEL—An exhibition scale model is an exact non-flying replica of a man-carrying airplane, every part being proportional in size and location to the corresponding part of the larger plane. The N.A.A. does not recognize any categories of exhibition scale models, but for the guidance of local contest committees suggested rules are given later.

AUTOGIRO—An autogiro model is supported in flight by the action of the air on vanes which rotate freely on an approximately vertical axis, supplemented by the thrust of a propeller on an approximately horizontal axis. The area of the vanes' surface shall be not less than that of the fixed wing. There are no size-subdivisions of autogiro models. The launching method is optional, either hand-launched or R.O.G. The effective area of the supporting surfaces is considered to be the sum of the area of the fixed wing plus the area of the vanes. Autogiro models for outdoor records must conform to the weight-for-area rule.

HELICOPTER—A helicopter model must rise without any assistance and be supported in flight solely by the lift of a power driven air-screw or vanes. There are no size-subdivisions of helicopter models.

ORNITHOPTER—A heavier-than-air craft which derives its lift and propulsion solely from the flapping of wings. There are no size-subdivisions of ornithopters.

VACUUPLANES, ROTORPLANES and other experimental types are not yet classified or subdivided as they are not sufficiently standardized.

LIGHTER-THAN-AIR CRAFT are not classified.

Contest Rules

ACCEPTANCE OF RECORDS—No record is official until it has been accepted by the Contest Board of the National Aeronautic Association. Only duration records for flying models are officially recognized. All records to be eligible for recognition must be made in sanctioned meets or under specific direction of the Contest Board of the N.A.A. This committee shall be the final judge in the interpretation of all rules.

WHO MAY COMPETE—Contestants in any official contest for establishing records or for N.A.A. trophies shall be members of the N.A.A. or of an affiliated organization. Contestants younger than 16 years are classed as juniors. Those over 16 but under 21 years are classed as seniors. Contestants over 21 are eligible for competition in the OPEN class. There are separate categories of records for each group, the records being classed as junior, senior or open, according to the contestant's age when the record was made.

OFFICIALS—All sanctioned contests, meets or record trials shall be conducted by an officially appointed N.A.A. Contest Director who may name as many assistants as necessary. At least two timers must observe each flight.

DESIGNS OF MODELS—There are no restrictions on the design of the models except that they shall meet the specifications named in the definitions and classifications. However, the models must be so designed that they drop no part in flight.

NUMBER OF MODELS—Each contestant will be allowed a maximum of three

models in each event, and he may use any or all to complete his flights.

NUMBER OF FLIGHTS—Each contestant will be allowed a total of three official flights. A flight is a start that lasts 10 seconds or longer in an outdoor contest, and 30 seconds or longer in an indoor contest. Any flight less than that or failure to fly promptly when called shall be judged a delayed flight. Three successive delayed flights shall be considered as displacing one official flight. A contestant also makes a delayed flight when his model meets an obstruction that prevents further flight. Should a contestant not make one complete official flight in his nine possible chances, his best delayed flight shall be recorded as his best time. Actual flight time shall be credited for a flight which ends by obstruction, no allowance being added for such mishap.

TIME OF FLIGHTS—Flight time starts the instant a model is in flight and ends when the model first touches the ground or floor after being launched, or meets an obstruction that prevents further flights. Time also ends when a model passes from the timers' sight, but the timers shall make every effort to keep the model in sight until it lands. If a model meets an obstruction and falls free independently and resumes flight within ten seconds, time shall continue uninterrupted.

GASOLINE POWERED MODELS—Any model using internal combustion power is limited to a total weight without fuel of seven pounds. The amount of fuel that may be carried for record flights is limited to one quarter ounce, liquid, for each pound of weight of the model. The term "fuel" is interpreted as the mixture which is taken or forced into the cylinder or cylinders. Only seniors and open class contestants may compete with internal combustion engine models.

BUILDER OF MODEL—Each contestant shall build his model himself with the exception of bearings and power plant. The design may be obtained from any source. Only the builder may fly the model for records.

TERRAIN—The terrain for outdoor meets shall not vary as to difference of level more than standard practice for landing areas of airports.

DISQUALIFICATIONS—Any contestant who breaks any rule of a contest, or conducts himself contrary to the ordinary requirements of common courtesy, may upon recommendation of the officials be disqualified. Models broken in landing are not disqualified.

PROTESTS—Protests will be considered only when presented in writing to the local Contest Director on the day of the meet.

NOTES

These rules are subject to change or enlargement by the Contest Board of the N.A.A.

Throughout, there is no suggestion of limit to the length of fuselage, motor, or motor stick. It is believed that the limiting of wing area is sufficient. So long as models are within the specifications of the Definitions and Rules they are eligible.

Speed records will not be recognized until it is clearly evident that there is need of this. Speeds of over 60 miles an hour are attained by models travelling a distance of 150 feet. It is difficult to time speed flights accurately. Hence the speed contest is not encouraged.

Altitude records are not recognized as accurate measurements are not obtainable.

Distance records are not recognized as they rarely reflect a model's true merit. The air is seldom still enough for distance contests.

There is no official recognizance given of whether a model is a pusher or tractor, or whether more than one propeller or motor is used.

Except where specified, the power is optional. Experiments with compressed air, internal combustion, steam, and other types of power are to be encouraged.

Rocket planes using explosives, are not encouraged and recognition will not be given to flights made by such models.

No separate categories are as yet listed for types of aircraft such as rotorplanes, paddle-wings, and other experimental types.

Should experience show that additional categories are needed, they will be listed; if certain categories prove to be unwarranted, they will be dropped.

Suggestions and recommendations will be considered by the Committee on Junior Activity and Model Building, National Aeronautic Association, Dupont Circle, Washington, D.C.

TABLES

SUGGESTIONS FOR EXHIBITION SCALE MODEL CONTESTS

The Exhibition Scale Model Contest is not a flying event, but a contest of workmanship. The scale model is a miniature reproduction of a man-carrying plane, complete in as many details as the builder's skill will permit. These models are judged on their resemblance to the original, and on their workmanship.

A suggested Scale Model Score Card follows:

EXHIBITION SCALE MODEL SCORE CARD Entrant's Number.....

	Full Value	*Judge's Estimate*
GENERAL WORKMANSHIP		
1. Neatness of workmanship	15	
2. Amount of detail (This includes such details as controls, engine parts, upholstery, fire extinguishers, instrument board details, lighting, etc.)	15	
3. Originality (This includes originality in reproducing details and parts of the entire model)	10	
4. Color and finish	10	
Total	50	
FIDELITY OF SCALE		
1. Fuselage (Length, depth, width, shape similarity, etc.)	10	
2. Wings (Span, chord, airfoil)	10	
3. Landing gear	10	
4. Empennage	10	
5. Engine, propeller, etc.	10	
Total	50	
Grand Total	100	

Signed .....

CATEGORIES

The National Aeronautic Association recognizes official records in the following categories for junior, senior and open competition:

INDOORS

STICK MODELS

Airplanes
- Hand-launched ..... Class B, C.
- R.O.G. ..... Class A, B.
- R.O.W. ..... Class A, B.

Gliders
- Hand-launched ..... Class A, B.

Autogiros
- Launching optional; no classes for size.

Ornithopters
- Launching optional; no classes for size.

Helicopters
- Launching optional; no classes for size.

FUSELAGE MODELS

Airplanes
- R.O.G. ..... Class B, C.
- R.O.W. ..... Class B.

OUTDOORS

STICK MODELS

Airplanes
- Hand-launched ..... Class C, D.
- R.O.W. ..... Class C, D.

Gliders
- Hand-launched ..... Class B, C, D.
- Tow-line-launched ..... Class C, D, E.

Autogiros
- Launching optional; no classes for size.

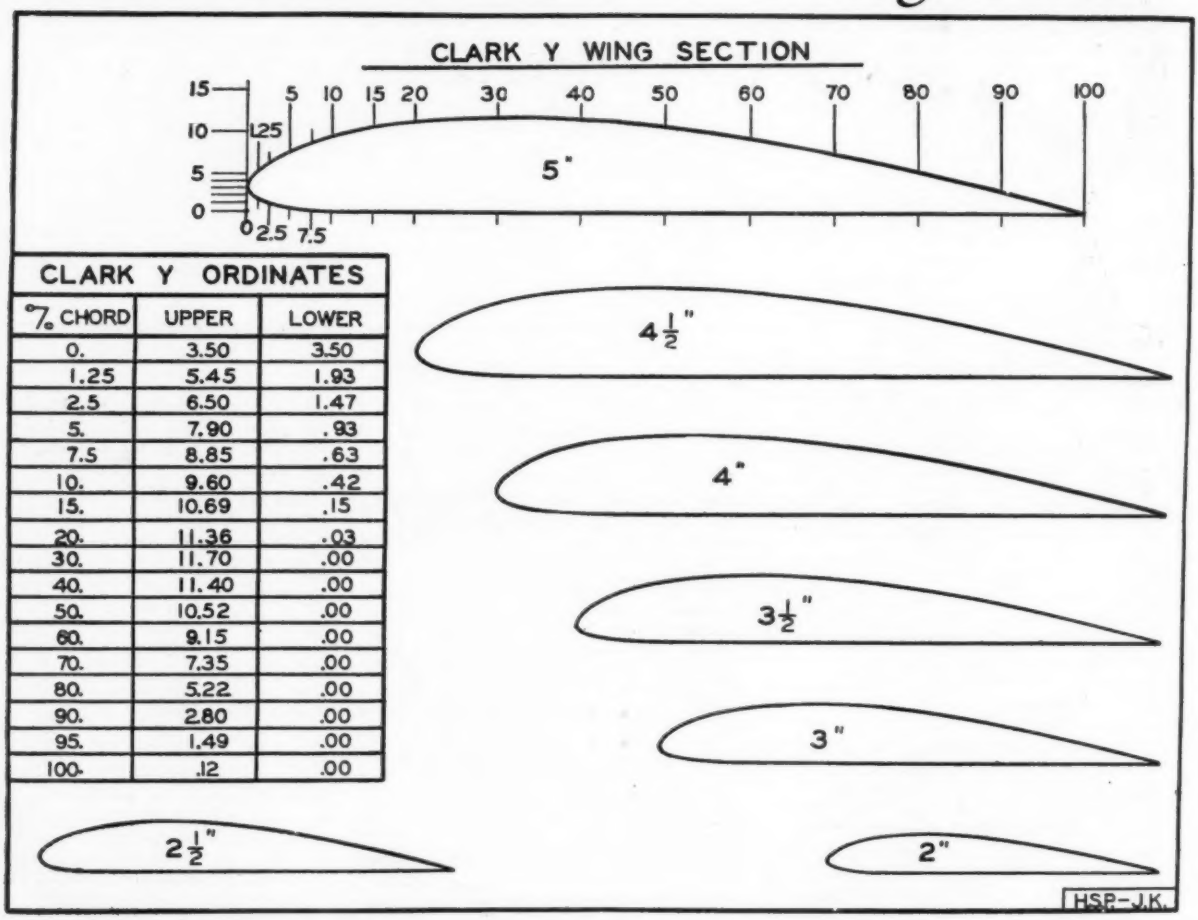
Ornithopters
- Launching optional; no classes for size.

Helicopters
- Launching optional; no classes for size.

FUSELAGE MODELS

Airplanes
- R.O.G. ..... Class C, D, E.
- R.O.W. ..... Class C, D.

How to Make Clark "Y" Wing Sections



CLARK Y ORDINATES		
% CHORD	UPPER	LOWER
0.	3.50	3.50
1.25	5.45	1.93
2.5	6.50	1.47
5.	7.90	.93
7.5	8.85	.63
10.	9.60	.42
15.	10.69	.15
20.	11.36	.03
30.	11.70	.00
40.	11.40	.00
50.	10.52	.00
60.	9.15	.00
70.	7.35	.00
80.	5.22	.00
90.	2.80	.00
95.	1.49	.00
100.	.12	.00

THE above drawing has been prepared for the model builder in order that he may have available accurate wing section patterns of several useful sizes of the Clark "Y" wing section. If you wish to use any one of the profiles shown, either trace it very carefully or cut it out and paste it on a piece of sheet brass or aluminum with the same outline.

The Clark "Y" wing profile is without doubt, the most widely used commercial wing section. It was used on Col. Lindbergh's "Spirit of St. Louis" Ryan Monoplane, the Curtiss "Hawks," the Brunner-Winkle "Bird" and many other well-known and efficient airplanes.

It is undoubtedly one of the best model profiles in use, for both aerodynamic and structural reasons. Aerodynamically, it is well-known because of its high lift-drag ratio. At plus 2 degrees angle of attack, it has an L/D ratio of 20 to 1. This lift-drag ratio is just what the name implies; i.e., for every 20 pounds of life the wing produces, it creates 1 pound of drag. A 2 degree angle of incidence is the best setting for a normal flying model (tractor type) and it should be measured relative to the thrust line. This profile is popular for structural reasons as it allows for a comparatively deep rear spar, which makes possible a strong wing structure.

By JOSEPH KOVEL

On the above drawing, you will find a table of figures labeled "Clark Y Ordinates." These "ordinates" are units representing the percent of the chord from the leading edge of the wing (0%) to the trailing edge (100%), and from the base line (0%) up. These are to enable you to draw your own accurate wing sections if the sizes drawn here are not suitable for the size wing you intend to build.

As an example, we will describe the precedure in making a 12" chord wing section, suitable for a gas model.

On a sheet of paper, draw a horizontal base line slightly over 12" in length. At the left hand side of this line, erect a perpendicular to it and label it 0% at the point it intersects the base line.

Measure 12" along the base line from the 0% perpendicular and draw another perpendicular at that station, labeling it 100% at the point it intersects the base line. Now, with either an engineer's scale or a pair of dividers, divide the 12" base line into 10 equal sections. Draw perpendiculars to the base line at these points and label them from 10% to 90% as shown in the 5" section on the drawing. To obtain the 1.25%, 2.5%, 5%, 7.5%, stations, just divide the 0%—10% space by 2 and you have two 5% sections. Divide the two 5% spaces by 2 and you have four 2.5% sections. Now divide the first 2.5% space by two and you have two 1.25% sections. Erect perpendiculars to the base line at each of these points.

In order to graduate a scale for the reference line on the 0% station of the horizontal base line, all you have to do is to take a pair of dividers, adjust them so that the space between the points is equal to the 5% space on the horizontal base line, then, with one point of the dividers pivoting on the 0%—0% point, swing a short arc on the vertical reference line. The intersection of the arc and the reference line determines the 5% station. Pivot the point of the dividers at this 5% station, swing a short arc on the same reference line and you have the position for the 10% station. Erect the 15% station by using the same method. To construct the 1% stations, adjust the dividers so that you may mark off 5 equal spaces on the 0%—5% space on the vertical reference line. This is done by the "Trial" method.

Now go back to the horizontal base line and the table of ordinates. Starting at the 0% point, you will notice the table reads 3.5 for both the upper and lower curves. Using the scale at the reference line, put a

(Continued on page 48)

NEW SELLEY-TEX CONSTRUCTION SETS STARTLE THE "MODEL" WORLD!

America OK's this revolutionary idea in simplified building!

SELLEY'S *exclusive* FLYING MODEL KITS *eliminate* 60% *of the work!*

New? Exciting? SELLEY-TEX is the greatest model building advancement of the age! It makes all Balsa Stick kits old-fashioned! Leading aviation experts wholeheartedly endorse this amazingly easy construction idea. No wonder the boys of America are accepting SELLEY-TEX CONSTRUCTION SETS as the practical answer to their model building problems. SELLEY-TEX is a moulded fabric much lighter and stronger than balsa wood. No longer need you shape the most complicated and most difficult parts of the plane. They now come to you perfectly moulded and are so simple to join the average boy can easily build and actually fly them! SELLEY is proud to offer these masterpieces of authentic flying scale models for your enjoyment. Every one of these exclusive kits carry SELLEY'S FULL MONEY-BACK GUARANTEE.
Here are $10.00 values at a fraction of their worth! Buy SELLEY-TEX CONSTRUCTION SETS—THE MODERN METHOD OF MODEL BUILDING! SELECT AND ORDER YOURS NOW!

■ U.S. Pat. App. for

"Your method of accurately forming the major parts of a model mechanically seems to simplify the art to such a degree that anyone can now be a successful model builder."
Signed Clarence D. Chamberlin.

3.00
25c Postage

RYAN Sportster

THE NEW RYAN SPORTSTER. An exceptionally realistic miniature, embodying every modern principle of light commercial planes to assure long distance flying.

The SELLEY-TEX moulded parts included in this kit are as follows: Fuselage, balancing ring, nose piece, spinner, head rest, rudder fairing and combination pants and landing gear; these together with special parts and materials as listed complete this outstanding value.

Burnelli Aircraft, Ltd.

"The familiarity of the American youth with this moulded process will pave the way for its application to full size aircraft."—Signed Vincent Burnelli.

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BOEING

BOEING F4B4. A dynamic reproduction of the popular Navy pursuit plane, developed for stamina and designed for speed.

The SELLEY-TEX moulded parts include fuselage sides, bulkhead, balancing ring, head rest, wheel fairing and tail-wheel fairing, special sealed 9-cylinder radial motor detailed with push rods and a drag ring. Also the many special parts and materials as listed come in every SELLEY-TEX kit. WHAT A VALUE!

Casey Jones School of Aeronautics

"With your new process I would judge almost any one should be able to make a successful flying model."
Signed—Casey Jones.

4.00
25c Postage

WACO D Military

WACO D MILITARY. A wealth of military detail characterizes this formidable prototype of the latest Army innovation, and what a flyer!

The SELLEY-TEX moulded parts comprise the following: Fully detailed fuselage, balancing ring, bulkhead, cowl, cowl bumps, wing mount guns, bombs, pants, pants fairing and a special fully scaled 9-cylinder radial motor with metal push rods. A special moulded celluloid enclosed cabin windshield is also included to give that added bit of realism, as well as all the special parts and materials as listed completes this unusual value!

EXCLUSIVE FEATURES FOUND ONLY IN SELLEY-TEX KITS

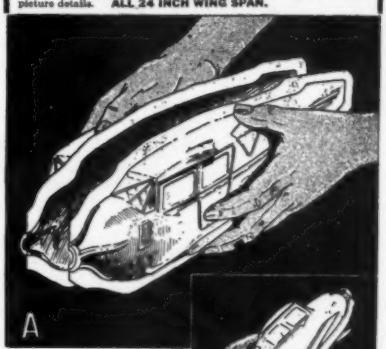
The following MOULDED Parts are finished in the authentic color combinations of each individual model:

Motor	Balancing Ring	Cabin Windshield
Cowl	Pants	Control fittings
Cowl Bumps	Pants Fairing	Adjustable Prop.
Fuselage Bulkhead	Bombs & Guns	

All the tools necessary to build model are supplied
Clamps—Razor Blade, Brush, Sandpaper

LISTED PARTS AND ACCESSORIES

Finished scale flying, adjustable pitch metal prop, finished propeller shaft and rear hook, scaled wheels, with brass bushings, ribs printed out accurately on white sheet balsa, many special turned wood parts, finest grade of balsa wood, sticks, tail wheel and fork fittings, control horns and wire, pure para rubber, special bamboo paper, authentic markings, colored insignia, best quality cement, colored dopes, full size easy-to-understand plan, complete with all picture details. **ALL 24 INCH WING SPAN.**



SIMPLE AS ABC

A—Fit together and cement the two moulded parts of the fuselage.

B—Cut away the border of excess fabric.

C—The result is a perfectly shaped fuselage in the form of a hollow shell, very strong and indestructible.

All other SELLEY-TEX moulded parts as listed are equally easy to build. They take the aggravation and perspiration out of model building.

CURTISS GOSHAWK

4.00
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GOSHAWK. A powerfully attractive flying scale replica of the speedy Navy fighter and accurate to the minutest detail.

The following SELLEY-TEX moulded parts: Fully detailed fuselage, bulkhead, head rest, balancing ring, drag ring, bombs, belly tank, wheel shoes, shoe fairing, tail wheel fairing and a special fully scaled 9-cylinder motor, detailed with push rods, all the fine scale parts and materials as listed complete this very extraordinary value!

Aero Digest

"Let me add my congratulations to those you certainly must be receiving from everyone who appreciates the problems of model builders."—Signed —Geo. F. McLaughlin, Editor.

"What is most amazing about SELLY-TEX moulded construction is its faithful reproduction of the original plane, yet retaining low structural weights." Signed —John Carisi.

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WACO C Cabin

WACO C CABIN. A masterpiece of authentic model design, incorporating every scientific feature to insure maximum flying performance.

Fully detailed SELLEY-TEX moulded fuselage, bulkhead, balancing ring, cowl, cowl bumps, pants, pants fairing and a special full-scale 9-cylinder motor, with metal push-rods and a special moulded celluloid cabin windshield; the many special scale parts and materials as listed complete this amazing value.

AT LAST! THE MODEL BUILDER'S DREAM REALIZED! Here is the easiest, quickest way to build a model plane ever created. SELLEY-TEX makes your hobby a PLEASURE instead of a task. Why pay even one dollar for worthless kits you cannot assemble. Pay the difference and get honest value!

The beauty, quality and performance of your SELLEY-TEX plane will remain long after price is forgotten. TRY SELLEY-TEX AND CONVINCE YOURSELF.

FREE! Just off the press! Write for our beautiful, two-colored broadside containing illustrations and details about the new SELLEY line of incomparable SELLEY-TEX Construction sets. Send 3c stamp for postage.

DEALERS!

Cash in on the growing demand! Write for discounts, propaganda, etc.

FAIRCHILD 22

3.00
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FAIRCHILD 22. A magnificent example of practical model construction, embracing durability of structure and ease of performance.

The SELLEY-TEX moulded parts include fuselage, bulkhead, balancing ring, cowl, pants and pants fairing, special 7-cylinder radial motor to scale with push rods, and exhaust fairing, also all materials and special parts as listed complete this remarkable value.

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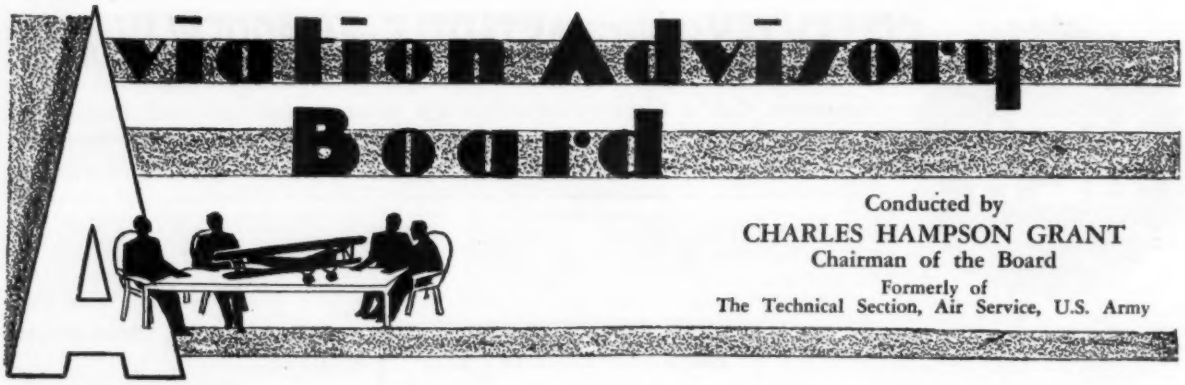


Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

WE WILL endeavor to swell the mass intelligence of our model airplane fans by answering a few questions which we have received this month.

Bill Vinton of 950 Waddington, Birmingham, Michigan, wishes to know the following:

Question: What is meant by giving a model "wash-in"?

Answer: "Wash-in" pertains to the angular setting of the wing. A wing is said to be "washed-in" when it is twisted so that the rear edge at the tip is pulled down, giving the wing a greater angle of incidence at the tip than at the center section. The center section lies directly over the body or fuselage.

As an example, a wing is "washed-in" if the angle of incidence (angle at which the wing is set relative to the line of thrust) at its center is for instance, one degree, and the angle of incidence at the tip of the wing is three degrees. "Washed-out" refers to the condition where the angle of incidence of the wing is *less* at the tip than at the center.

Here we have a question from Kenneth Perkins of 333-76th Street, Brooklyn, New York. He asks:

Question: How does a rotary motor work?

Answer: A rotary engine operates in a manner which is directly opposite to the ordinary stationary engine. In the rotary engine the crankshaft is stationary around which the whole engine turns as a flywheel. Instead of the pistons pushing down on the connecting rod and in turn causing the shaft to revolve, the pistons remain stationary and the cylinder head is pushed away from the pistons, thus the engine is turned. The propeller is fastened to the crank case of the engine instead of the crank shaft. There are no United States makes of rotary engines. However, during the War, they were made in Europe. Since that time the manufacture of these engines has been discontinued.

Robert Beldner of 223 Seventh Street, Garden City, New York, wants to know the answers to the following questions. He is evidently building model airplanes in a big way, for he asks:

Question: What is the most satisfactory covering for a five foot detailed scale model?

Answer: A good grade of China silk of tight weave is best.

Question: If silk is used, what is the process of covering and tightening it?

Answer: The silk should be cut to proper shape and placed over the part to be covered. Where it comes in contact with the frame, apply dope or cement to the outside of the silk with a brush, pulling the silk tight in the direction which is parallel to the wing spars. This process should be started at the center of the wing and the silk fastened to the frame progressively, from rib to rib, toward the tip. The whole surface of the silk should not be covered with the cement or dope when it is being cemented in place. However, after the cement is thoroughly dried the silk may be doped with ordinary wing dope. Probably three or four coats will be required. This will fill the pores of the silk and tighten it.

The wing may then be painted with a colored dope or lacquer containing pigment of the required color. To give a fine gloss, apply a thin coat of dope over the coat of lacquer. If you have a sprayer, it is best to spray this final coat on the wing.

Vincent Grill of 4226 White Plains Avenue, New York City, wants to know:

Question: My fuselage model glides very well but when I launch it with power, it stalls. Why is this?

Answer: This condition suggests that the stabilizer is at too great a *negative* angle. When the difference in angle between the wing and the stabilizer is very large, any increase in speed creates a stalling tendency. At the usual slow gliding speed, this type of ship will fly normally. We would suggest that you raise the front edge of the stabilizer $\frac{1}{16}$" at a time until the flight is what you desire.

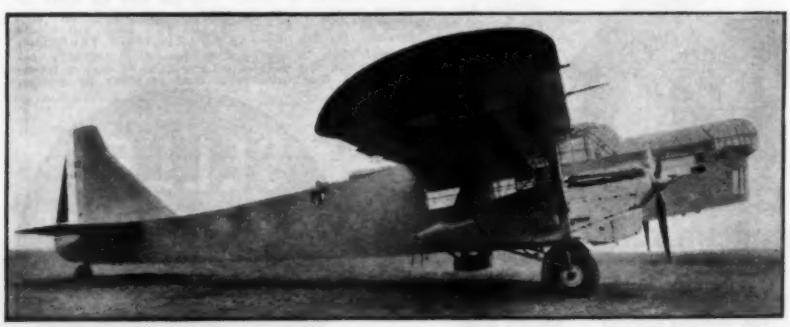
Here are a few more questions:

Question: If you put two strands of rubber in a plane and coat them with rubber lubricant, would it get power even if the plans of the plane told you to use one strand, or would the power be too much for the plane?

Answer: Yes, you certainly would get power. Whether you get too much power or not would depend upon the type of plane in which you made this change. Usually a plane is designed so that it will withstand the tension of the correct amount of rubber. If double the amount of rubber is added, the tension will probably be sufficient to twist the body of the plane out of shape, if not break it, especially if the ship has been well designed; inasmuch as a well designed ship is never made stronger than is necessary. Added unnecessary weight puts a greater load on other parts of the plane. The only way to determine whether or not two strands would be too powerful is to try it.

Question: What is the meaning of the following: "The ailerons are balanced both statically and aerodynamically?"

Answer: When the ailerons are balanced statically, they balance in regard to their own weight without the action of any external forces; otherwise the point of support is at the center of gravity of the aileron. When they are balanced aerodynamically, they are balanced relative to the pressure of the air acting upon them. In this case, the points of support are at the center of air pressure. When the aileron is balanced statically and aerodynamically, the center of gravity and the center of pressure are the same distance from the



This is one of the latest French flying battleships, the Potez Multiplace Combat Ship, type No. 54. It is powered with two 500 hp. Hispano Suiza engines and armed "to the teeth" with machine-guns

leading edge of the wing and are at the point at which the aileron is supported or around which it rotates.

Bob Clapp of 56 North Seventh Avenue, Beech Grove, Ind., wants to build a model which has exceptional climb and he has asked several questions, the answers to which he feels would be of value in building his model. Here they are:

Question: Should the center of gravity be located high, low, in front of or in back of the center of lift in a climbing model?

Answer: In reading this over we wonder why Clapp assumes that the center of gravity has anything to do with the problem. Usually the center of gravity has to do with the balance of a model, not with its ability to gain altitude. Of course, a model must be properly balanced in order to gain altitude, or in fact fly at all. There is no set position for the center of gravity in order to have the model climb properly.

Question: What branch of aviation would be the best to take up, in regard to working conditions, hours, wages, etc.

Answer: From this question I would judge that you are a little "choosy." This indicates immediately that, at present, you are not suited for the rigorous study and the hardships through which you will have to pass in order to be successful in this field of activity. Such things as these can not be considered if you wish to land at the "top of the heap." The only motivating force which you must allow to influence you is the desire to attain your goal, regardless of the difficulties which may arise. If you have an easy time in your profession, probably you will learn very little and will not be schooled to overcome difficulties. Don't try to avoid difficulties, conquer them.

Saul Bassin of 1574 Beach Avenue, New York City, is worried about airplane tail skids and wants us to solve his problem?

Question: How is the height and position of the tail skid found?

Answer: These are influenced by two distinct factors. First, it must be determined how much spring is required in the tail skid in order to allow it to absorb the shocks of landing. The weight of the machine and its general design determine this. The tail skid must be high enough, or one might say long enough, to allow it to spring to its full extent without the tail or fuselage striking the ground. Second, it must be long enough to keep the fuselage from dragging when the plane lands in soft muck, plowed fields, or other loose fragments of terra firma.

If the tail skid was very short it would sink deeply into the ground, if the ground was soft, the fuselage would drag in the dirt, possibly collecting a considerable amount of debris inside the fuselage. This would throw the ship off balance, and in many cases with which I am familiar, would cause tail spinning and many dangerous conditions for the pilot. A skid usually should not be less than one foot long. The position of this tail skid depends upon the design of the ship structurally and the shape of the tail and

BUILD These Beautiful Super-Detail Guaranteed Flying Planes—All in Exact Scale with Cockpit Operated Controls . . . Designed for you by flying men. . . . Famous IDEAL Quality.

STINSON RELIANT

Wingspan 32 5/16," length 21¼", weight 3½ oz., exact ¾" scale. Adjustable speed arresters built into the wings, movable cabin doors, complete interior with four seats and control column, and all the other Super-Detail features. Colored in bright contrasting yellow and black. Kit complete, postpaid..... **$2.50**

CURTISS GOSHAWK

Wingspan 23⅜", length 16⅜", weight 3⅛ oz., exact ¾" scale. Coated with new IDEAL high lustre finish, with silver, yellow, red and black coloring. Kit complete, postpaid..... **$2.00**

BOEING P-26A

Wingspan 21¼", length 18", weight 2½ oz. Exact ¾" scale. This flying model is an exact replica of the famous fighter—one that is identical in all but size with its noteworthy big brother. Beautifully colored in olive drab and yellow. All Super-Detail parts included. Kit complete, postpaid..... **$1.75**

ILLUSTRATED FOLDER

Send 25c for the new IDEAL folder showing the latest model Planes and Boats. It contains valuable information on how you can make real money by building and selling these famous flying models.

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As Light as Balsa with Twice the Strength!

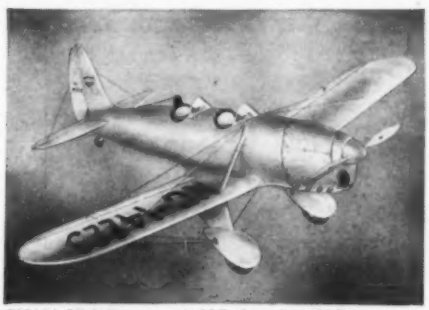
NEW LOW PRICES!

STANDARD STYLE (Shown at Left)

5 inch	15c	each
6 inch	20c	each
7 inch	25c	each
8 inch	30c	each
9 inch	35c	each
10 inch	40c	each
11 inch	45c	each
12 inch	50c	each
13 inch	60c	each
14 inch	65c	each
15 inch	75c	each
16 inch	90c	each
18 inch	$1.10	each
20 inch	1.30	each

STEEL-TYPE STYLE (Shown at Right)

5 inch	20c	each
6 inch	25c	each
7 inch	30c	each
8 inch	35c	each
9 inch	40c	each
10 inch	45c	each
11 inch	50c	each
12 inch	60c	each
13 inch	70c	each
14 inch	80c	each
15 inch	90c	each
16 inch	$1.10	each
18 inch	1.25	each
20 inch	1.50	each



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Ryan has dual control system which operates in either cockpit; adjustable wing flaps; plans for making an actual working engine—4 cylinders with movable pistons, carburetor and spark plugs.

MARTIN BOMBER

Wingspan 35", length 22½", weight 4½ oz. Exact scale. Retractable landing gear, rotating gun turret, movable machine guns, special streamline cowlings, two types of 3 bladed propellers—one for flying and one for exhibition with removable motor sticks for flying; rudder and elevator balanced surfaces; new type freese ailerons. Kit complete, postpaid..... **$3.50**

REX

29"—scale 1/32" to the foot.

Shaped hull and over 100 metal fittings. 24 cast metal lifeboats; 24 cast stairways; 2 cast anchors; 4 metal propellers; 6 cast bits; 48 metal davits. The Rex comes in beautiful high luster original colors of black, orange, white, red and green; and the kit also contains turned wood parts, printed wood, cement, wood filler, sandpaper, etc. Full sized plans with complete instructions and 7 photographs illustrating the different stages of construction. All the hard work has been done for you. Kit complete, postpaid..... **$6.00**

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PROPELLERS

As Light as Balsa with Twice the Strength!

Accurately carved and beautifully finished by hand. Guaranteed true balance, with hole drilled for propeller shaft. The perfect prop for efficiency on flying models and realistic appearance on exhibition models.

NONE GENUINE

WITHOUT THIS LaBEL

New 3-Blade Style

A new addition to the IMP line, and the only completely-finished, featherweight, three-blade prop obtainable. Beautifully made, perfectly balanced blades mounted in a strong hub, with hole drilled for shaft. Mahogany finished. Official tests show 30 to 150 feet greater flight distance with these props.

Diameter	Price Each
6 in.	65c
7 "	80c
8 "	90c
9 "	$1.10
10 "	1.20
12 "	1.50
15 "	2.00

Prices Include Postage.

STANDARD TYPE

STEEL TYPE

HELICAL NAVY TYPE

Low Prices for Regulation Propellers

Size	Standard Type	Helical Navy Type	Steel Type
5 in. each	15c	20c	20c
6 " "	20c	25c	25c
7 " "	25c	30c	30c
8 " "	30c	35c	35c
9 " "	35c	40c	40c
10 " "	40c	45c	45c
11 " "	45c	50c	50c
12 " "	50c	55c	60c
13 " "	60c	65c	70c
14 " "	65c	75c	80c
15 " "	75c	80c	90c
16 " "	90c		1.10
18 " "	1.10		1.25
20 " "	1.30		1.50

Prices include postage.

New Complete Prop. Assembly

NEW B-91 ASSEMBLY

A miniature duplicate of the equipment used on many battle planes. Beautifully made, mahogany finished propeller, with nose piece and adjusting ring, fitted with complete shaft and bearing. In 8 sizes, as follows:

Size	5"	6"	7"	8"	9"	10"	12"	15"
Each	40c	45c	55c	65c	80c	90c	$1.25	$1.65

Prices Include Postage

All the above articles have been tested and approved by Junior Birdmen Institute.

All Leading Dealers, Dept. Stores and Specialty Shops Now Sell IMP Paulownia Wood Propellers and Accessories. If unobtainable from your local dealer, order direct. Send 3c for Illustrated Guide to Propeller Value; full information on Propellers, Shafts, Bearings, etc.

DEALERS: Write for trade discounts.

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rear part of the fuselage. It must be located at such a point on the fuselage that the stresses will be absorbed easily by the internal structure so the rear of the fuselage and the tail assembly will not strike the ground.

Air Ways—Here and There

(Continued from page 23)

which gives the plane a very rapid climb. The ship glides for twice as long as the engine runs. The important part is that the engine runs for fifty-two minutes on one ounce of gasoline. To date the ship has made twenty-four flights. The engine itself is well named "The Elf."

Wind tunnel experiments are exceedingly expensive, but this has not daunted many of our experimenters. Picture No. 8 shows a wind tunnel model constructed by Clinton A. Schmaling, which represents a new ship of his design. Mr. Schmaling has constructed his own wind tunnel, which together with his laboratories, are located at Millerton, New York. He is especially interested in developing military craft without "blind spots" and is hard at work on this problem.

Here is a surprise! Picture No. 9 shows one of our favorite Western movie stars, Hoot Gibson, reading his copy of MODEL AIRPLANE NEWS will be among the thought Hoot was interested in aviation? However, it is true. He is an aviation enthusiast and has won several aviation contests. He is extremely interested in model airplane building and flying, and tells us that he never misses getting his copy of MODEL AIRPLANE NEWS each month. Three long-term subscriptions to MODEL AIRPLANE NEWS will be among the many prizes in a contest run in connection with Hoot's latest Western thriller, "Sunset Range," sponsored by the Bost Tooth Paste Corporation, and First Division Pictures. Those entering this contest should write to the Bost Tooth Paste Corporation, Grand Central Palace, New York City, not later than August 5, 1935.

Bob File of 502 Seymour Avenue, Columbus, Ohio, is at it again! As our old readers know, he is one of our model glider experts, having won the glider event in the 1934 National Competition. Picture No. 10 shows him with one of his latest creations in soaring planes. He said he built this five foot Bowlus Dragonfly glider just to keep in practice. The ship weighs just one ounce and has made dozens of flights. The best time so far has been four and a half minutes, but Bob says, "Give me time." Last year Bob put up a glider for twenty-three minutes. He tells us that interest in model building is reviving in Columbus, Ohio, especially among the older fellows. They have formed a club known as the Advanced Model Aviation Society. It is for enthusiasts over twenty-one years of age, with a junior division for those eighteen to twenty-one. At present there are thirty-five active members.

"I will see you at St. Louis," says Bob.

MODEL NEWS FROM OTHER COUNTRIES

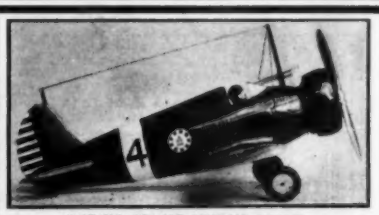
Australia

From Mr. Freshman, Secretary of the Model Flying Club of Australia, we received one or two interesting notes. Jack Finneran received the Australian Broadcasting Commission's Trophy, which established him as the indoor model champion. It was presented by Sir Keith-Smith. This event took place in Sydney on February 12th.

We received another very interesting picture, No. 11. It is a tri-motor rubber-driven model in actual flight. There are very few of these, if any, in this country that will perform well and the builder of this ship is to be complimented. The three propellers are driven by one rubber motor and the ship usually flies forty to forty-five seconds. The two outboard propellers are driven by belts from drums located on the shaft in the fuselage. Between each end of the shaft and the tail hook is a rubber motor. Also, there is a short length of rubber through the front end of the shaft forward to the hook of the nose propeller. Though these propellers revolve all in the same direction, there does not appear to be any tongue. The belts which drive the outboard propellers are coil springs. Why not try this arrangement some time on your models?"

France

Pierre Legros, General Secretary of the Models Air-Club of France, of 47 Rue des Tournelles, Paris, 8 eme, France, has been kind enough to send us picture No. 12, showing a group of the contestants at one of the recent contests held at Vincennes, France. In the letter he tells us that on April 2nd a large contest was held for



BOEING P29 ¼" AND ½" SCALE

NEW ½" TO THE FOOT SOLID SCALE KITS

Contents: All wood parts cut to shape, cast prop., finished wheels, wire, cell., detailed plan, sandpaper, insig., wood filler, cement, fillet compound, cowl finished, 4 bottles of lacquers, motor parts, brushes, etc.

Nieuport 28 — Gotha — Spad 13
Boeing P26A — Hawker S. Fury — Waco D Pursuit
Boeing P26A — Waco D Pursuit — Boeing P29
Northrop Fighter — Boeing P29

$1.00 EA. PLUS 10c POSTAGE

LEWIS MODEL AIRCRAFT
2210-9 Lombard Ave. Berwyn, Illinois

BOEING P26A ¼" AND ½" SCALE

NEW ¼" TO THE FOOT SOLID SCALE KITS

Kit contains: Wood parts cut out (body, wings, tail, etc.), pine struts, cast prop., pilots, guns), rubber tired wheels, detailed plan, wire, sandpaper, insignia, cell., cement, wood filler, fillet compound, 2 or 3 colors of lacquers, finished cowl, radiator screen, exhaust tubing, etc.

50c EACH. 4 FOR $1.50

Add 5c postage for single kit. 15c for 3 kits.

Grumman Fighter — Northrop Fighter — Waco D Pursuit
Wedell Racer 44 — Fokker DXVII Fighter — Boeing P26A
Macon Fighter — Hawk P43 — Boeing P26A
Curtiss Falcon — Seversky 3L — Fain Triplane
Curtiss Hawk — Consolidated P30 — Seahawk
Boeing P29 — Douglas Y10-43 — Vickers Jockey
Hawker S. Fury

rubber-driven models at this place near Paris. As yet, we have had no word of the results. Also, on the 30th of May, a contest was held for gasoline motor-driven models at the Military Aviation Field at Etampes, with the authorization of the Mistere de L'Air. Any one wishing to communicate with French model builders of this club should write Mr. Legros at the above address.

England

From England G. W. H. Lambert of 26 North Hyde Lane, Heston, Middlesex, sends us picture No. 13, showing his Comper Swift and the trophy which it won. This flying scale model is a beautiful job. You will note the careful workmanship exhibited by the propeller. It is built to a scale of one inch to one foot. It is decorated with the Prince of Wales colors and registration marks. The trophy is for second place, which it won in the King's Cup Race in 1933. The weight of the model is three ounces and it has a duration of twenty-eight seconds.

Mr. Burchell, a pioneer in model aircraft in England, awarded the cup for a yearly inter-club competition for flying scale models. This year is the first it has been put in competition. The contest was held at Tattenham Corner on Epsom Race Course. Mr. Lambert says that he lives on the edge of Heston Airport and that an American Monocoupe with British registration has been doing some excellent flying there.

South Africa

The model airplane bug has invaded South Africa. Mr. A. K. Garvie of 25 Forest Street, Forest Hill, Johannesburg, South Africa, writes and tells us that he is extremely interested in this pastime. He says that he is not able to obtain balsa wood, wing tissue, cement and dope. He has to use ordinary wood, paper, glue and other heavy materials. This is indeed a tragedy and a great misfortune and Mr. Garvie is to be commended for his ingenuity in designing ships with these materials, reminding us of the pioneering days of 1910 in this country; when model builders struggled under such conditions. He says, however, that the models give a fairly good showing considering the materials used.

He wants to know if some of our American readers will not write to him. I am sure that he will have some interesting things to tell them in return for information they may send him.

CLUB NEWS

Associated Model Builders of America

One of the model clubs located around New York which has been doing some excellent work is the Associated Model Builders of America, whose headquarters is 27-09 Newtown Avenue, Astoria, New York. Mr. Edward C. Bulger directs the activities of the club and keeps the members at a high pitch of excitement with weekly contests. The members are fortunate enough to have a large workshop in which many of their ideas originate and grow into fruitfulness. Picture No. 14 shows a group of club members at a recent contest. *(Continued on page 47)*

HOOT GIBSON Selects . . .

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—as Official Prizes in the Nation-wide Bost Tooth Paste Jingle Contest, in connection with the First Division Production " " "Sunset Range" starring Hoot Gibson "

and says—

"They're Swell Flyers."

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20" HOWARD "IKE" 50c Postpaid

Here's a line of kits that every model builder can afford to buy. We can safely say they are not to be compared or confused with other kits selling at this price or even higher.

50c EACH POSTPAID

Guaranteed to Fly!

20" CURTISS CYCLONE HAWK 50c Postpaid

20" FAIRCHILD CABIN 50c Postpaid

20" BOEING PURSUIT F4B-4 50c Postpaid

20" WACO Y.K.C. 50c Postpaid

● ● ● 25" DE LUXE HI-FLYERS

25" GREAT LAKES SPORT TRAINER $1.00 Postpaid

New, big, sturdy models that thousands of model builders are raving about. Every model has been designed with painstaking detail and is absolutely authentic. Every kit complete and designed for perfect models.

$1.00 EACH POSTPAID

Guaranteed to Fly 600 Feet

25" NEW MONOCOUPE, Model 145 $1.00 Postpaid

25" STEARMAN, Model 8I $1.00 Postpaid

● ● ● SCIENTIFIC'S 50" FAIRCHILD

Warner Powered Model "22" Newly Designed Landing Gear Built Into Fuselage: Special Shock Absorbers In Wheel Housings. Length 35". Takes right off the ground within 12 feet and flies just like the "big plane." Will rise, in most cases, to about 75 feet altitude. Red and blue fuselage, yellow wing and rudder.

$3.50 EACH POSTPAID

Guaranteed to Fly 500 to 750 Feet

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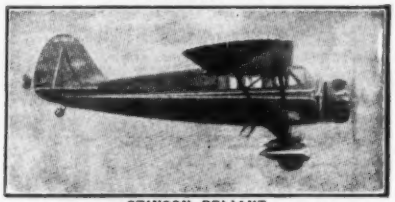

STINSON RELIANT

Movable Cockpit Control in these 24" Flyers

Here they are boys . . . take your pick . . . aren't they beauties? They are the newest Gold Seal fleet of 24" flying models with the new movable cockpit control. Control wires are so designed that they will not interfere with your rubber motor. Kit contains all horns, pulleys and hinges ready made, ¾ finished wheel pants, two colors tissue, all parts printed on Balsa, Aluminum spun cowl, finished propeller. Fully detailed plan and complete instructions, cement, dope, etc. Without doubt, the most elaborate Kits ever offered to the model builder. There are six models to choose from: **Curtis Swift, Spad, Douglass 038, Albatross, D 5A, Heli Diver, Stinson Reliant.**

$1.00 Postage 15c Extra

DOUGLASS 038

HELL DIVER

16" Flyers FAIRCHILD 22

Contains printed balsa parts, two colors tissue, wheels, wire, rubber, wood veneer, full-size plan dope, cement, etc., 8 models to choose from: **Goshawk, Fokker Triplane, Fokker D-I, Fairchild, Curtis Falcon, Howard Ike, Waco, Nieuport.** **30c** Ea. Postpaid

12" SOLID REPLICA MODELS

With die-cast propeller, two bottles color, cement, printed balsa parts, etc. 10 models to choose from: **Douglass, Gee Bee, Fairchild 24, Bristol Fighter, Monocoupe, Spad, Aeronca, Boeing X P 936, Stinson, Flamingo.**

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GEE BEE

6" to 8" REPLICA MODELS

Gee Bee, Sikorsky Amphibian, Mystery S, Racer, Fairchild 24, Howard Racer, Boeing P-12C, Nieuport 17 C-1, Curtis Hawk P 6E, Savoia Marchetti, Fokker D-VII, Sopwith Triplane, Spad, Northrop Gamma, Supermarine, S-E-5, Pfalz, De Havilland IV, Lockheed Vega, Heli Diver, Waco, Albatross. Postpaid **15c** Ea.

Mention planes wanted.

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Dealers! Send for Price List

CONSTRUCT-A-PLANE CO., Inc.

159 Graham Ave. Dept. 207 Brooklyn, N. Y.

On the Frontiers of Aviation

(Continued from page 19)

Performance data on the new Stearman trainer for the Navy follows:

High speed	125 m.p.h.
Landing speed	50 m.p.h.
Ceiling	14,000 ft.
Range, full speed	250 miles

The Curtiss Aeroplane & Motor Company has been awarded a contract for 135 scout observation planes for the U. S. Navy at a total price of $2,752,705. The planes will be two-place biplanes of very modern design.

The Martin Company was also awarded an order for fifteen more low-wing bombers to be delivered to the Army Air Corps on completion.

Model Airplane News hopes that it will be able to announce the awarding of at least four more Army Air Corps contracts next month for attack, pursuit, bombing and observation planes.

The new English low-wing Bristol fighter unfortunately cracked up on one of its test flights. Another one will undoubtedly be built soon.

The Argonaut Aircraft Company has out a new pusher low-priced amphibian. It is a high-wing monoplane with a pusher engine.

Specifications and performance data on the new Fairchild low-wing five-passenger monoplane follows:

Span	39' 6"
Length	28' 11"
Engine	Jacobs, 225 hp.
Height	8 ft.
Payload	880 lb.
High speed	170 m.p.h.
Cruising speed	156 m.p.h.
Landing speed	48 m.p.h.
Rate of climb	640 ft. per min.
Range	600 miles

A new wingless Pitcairn autogyro has been completed. It is a two-place open job.

Waco has completed a new four-place cabin biplane. It is known as the Custom Cabin Waco and has the following cruising speeds:

Continental	133 m.p.h.
Jacobs	137 m.p.h.
Wright	145m.p.h.

The Bellanca Aircraft Corp. may put out a pursuit and observation version of their low-wing racer built for Col. Fitzmaurice. The ship will be powered by a Hispano-Suiza 860 hp. engine.

HOW TO BUILD A SOLID WOOD SCALE MODEL OF THE FAIRCHILD AMPHIBIAN

Plans page 20

Balsa wood should be used in building the model. Get dimensions from three-view drawing.

Hull:—Draw outline of side view on stock and cut with saw. Make engine nacelle and hull out of the same piece of wood. Draw top elevation on piece next and cut. Round out the hull with razor blade, referring constantly to cross-sections on plans. Sandpaper the hull and nacelle with fine and then coarse sandpaper.

Wing:—Draw top view of wing on stock and cut to shape. Shave down the wing with a sharp chisel as shown by wing sections. Cut out the center section of the wing with razor blade so it will fit snugly into the sides of the hull. Sandpaper the wing thoroughly. Draw on ailerons and flaps.

Tail:—Cut out the three tail pieces from stock with razor blade and sandpaper to smoothness. Draw lines separating rudder from fin and elevators from stabilizer.

Prop:—Cut the prop from scrap wood. Insert a straight pin through the hub to act as propeller shaft.

Landing gear:—This is made from six small struts as shown on plans. Lay them aside for assembly. The wheels may be purchased or made. Cut out the two wing floats and the eight struts that hold them to wing.

Assembly:—Ambroid the wing sections to the hull with blocks under them to hold them in place. Connect up the tail, applying plenty of ambroid. Connect propeller to front of nacelle. Put on landing gear next. Apply plenty of ambroid to connections. Join wing floats in place and brace with black thread as shown on plans. Connect tail wheel.

Painting:—Dope or lacquer may be used in coloring the model. The color is optional. Several coats must be applied before a smooth surface is obtained. When paint has dried, the model will then be finished.

DEALERS! JOBBERS!

6 IN. ALL-BALSA STUNT GLIDERS

The fastest selling item you ever handled!

These strong little gliders ready to zoom, loop, fly in spirals, or make long, straight glides are the ideal things for the spring and summer. Every boy and girl old enough to walk is a potential customer. They retail at an uncommonly low price profitably. There is no limit to the amount you can sell! Splendid sales are guaranteed to confectionery, toy, bicycle, and sport shops. Don't let your competitor get the jump on you. Window display posters sent with every order. These low prices while they last:

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FIVE GROSS . . . . . $5.00 Postpaid

Orders shipped promptly.

Jobbers: If you can use at least 25 gross of these popular gliders, write for special quotations, and exclusive territory today.

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- Guaranteed Flight Performance
- Adjustable Controls
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- Authentic ¾" Scale
- 24" Wing Span
- New Bilt-Rite Constr.
- Kit Complete With Paint Tissue, Dope, Brushes, etc.

MODERN MODEL ENGINEERS

BEAVER DAM, WIS.

Sopwith Airplanes of the War

(Continued from page 9)

fitted with a 200 h.p. Canton Unne motor. Although never getting past an experimental stage, the "Cuckoo," a very successful torpedo plane, was later derived from the plans of this experimental plane.

The second plane tested for the navy met with greater success than the first mainly because of its excellent qualities. This plane, known as the "Bat Boat" was actually used by the R.N.A.S. for reconnaisance unarmed. The first of these Bat Boats were amphibians carrying a collapsible wheel undercarriage, very much like our present American ships of this type, enabling starts and landings from either land or water. A 100 hp. Green motor mounted directly over the main hull pushed the "Bat Boat I" along at the terrifying clip of 78 m.p.h. Twin rudders at the end of outriggers gave the ship a typical crated appearance and caused such sensitiveness with the least touch of the rudder bar that the plane warranted a redesigning of its longitudinal controls.

The newer "Bat Boat II" carried three sets of interplane struts instead of the previous two sets to the side, insuring greater strength to the sesqui-plane wings. The single outrigged rudder of the "Gun Bus" was again introduced and the ship was kept solely to the sea the landing gear being eliminated. The power plant was changed to a 200 hp. Salmson with the result that the added performance in speed and climb plus other new features of the "Bat Boat II," led the R.N.A.S. to enjoy the war knowing that their machine was dependable.

The first single-seater in line for the navy was by no means a friendly mate of the German Imperial Air Service. This plane, the "Baby Seaplane," was an immediate development of the "Tabloid," the characteristic difference being the installation of floats in the place of a land undercarriage. One of these planes, equipped with twin floats, made history at Monoco, winning the Schneider trophy. The machine used by the R.N.A.S. was very similar to the Schneider plane with the exception of a lower horsepowered motor. The military machine was equipped with a rather large tail float immediately under the rudder and the main floats were of the box non-step type.

Although the plans of this machine were conceived before the outbreak of the war, the "Baby Seaplane" wasn't called for active service until November of 1914, when the navy needed some fast single-seater planes. The length overall was 22 feet, 10 inches, with an equal span of both planes of 25 feet, 8 inches. The gap between the wings was four feet, six inches with a small dihedral angle of 2° on both planes. Powered by a 100 hp. Clerget rotary motor, the speed at 6,500 feet was 107 m.p.h., and the landing speed was 45 m.p.m. Forms of this machine with landing gears saw active service and were used by the navy until the appearance of their next Sopwith single-seater, the "Tripe Hound."

THE OUTSTANDING

BROWN JR MOTOR

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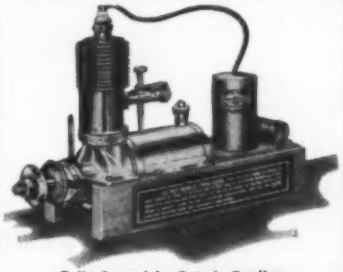
GASOLINE ENGINE

For Model Planes & Boats

Greatest Power Per Unit of Weight

Bare Motor 6½ Ounces—1/8 Horse Power



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The Big 50 Cent Flyers They All Rave About!

Whether you buy a kit for appearance, flights, or value —you will find them all here at an appealing price.

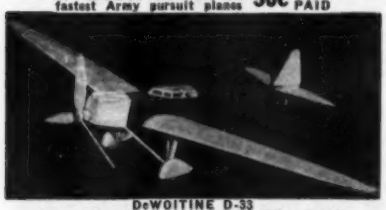
All Madison Kits Contain Plenty of Everything!

Look at this List:

1—Finished Hand-Carved (Paulownia) Hard Wood Propeller
1—2" Aluminum Drag Ring where required
2—Front and Rear Hooks—finished
2—1" Hard Wood wheels—finished
2—Sheets of colored Japanese tissue
1—Bottle of Alco Cement Ribs and Bulkheads printed on Balsa Wood
1—Strand of 3/16" Rubber
1—Piece of Celluloid
1—Full size plan
1—1 foot length .028 wire
All necessary wood for Stringers and Landing Gear

All Madison Kits include a 5½" Paulownia wood propeller—hand finished, true and balanced. Other Madison Models are: 15" Junkers D-1; 15" Waco Taper Wing; 15" Hell Diver; 15" Vought Corsair 03U-4; Madison Umbrella Type; 15" Fokker D-8; 15" Wedell Williams.

BOEING P12B
15" model of one of fastest Army pursuit planes 50c POST PAID



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1" diam. pair .06
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Used on real ships for cutting down wind resistance. A beautiful addition to any radial motored model.
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.005 per ft. .12
.010 per ft. .19
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Small 0.25 hole .07
Per doz. .50

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1/16x¾	12 for .05	⅛x⅛	6 for .05
⅛x¼	10 for .05	⅛x¼	4 for .05
⅛x3/16	8 for .05	3/16x3/16	6 for .10
⅛x¾	6 for .05	3/16x¼	6 for .11
⅛x½	4 for .05	¼x¼	6 for .12
3/16x3/16	6 for .10	¼x⅜	6 for .13
3/16x¼	6 for .11	¼x½	6 for .14
¼x¼	6 for .12	¼x⅝	6 for .15
¼x⅜	6 for .13	¼x¾	6 for .16
¼x½	6 for .14	⅜x⅜	6 for .17
¼x⅝	6 for .15	⅜x½	6 for .20
¼x¾	6 for .16	½x½	2 for .12

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1/32x2	2 for .05	1/16x3	2 for .06½
1/16x2	2 for .04½	⅛x2	2 for .06
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¼ flat 25 ft. .12
3/16 flat 25 ft. .15

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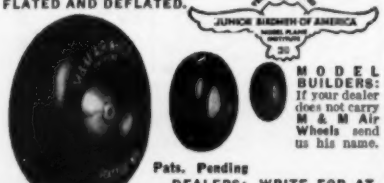

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Build This Model of the New Curtiss Fighter

(Continued from page 12)

The wing struts of ⅛" x ¼" are cut to the given length. The small struts are of 1/16" x 3/16". The fitting shown on the front view is a wire hook bent to shape and fastened to the strut so that it passes through a wire eyelet attached to the fuselage. The mounting of the wings is obvious as shown on the plan and as described.

Cowling

As the cowling is not regular in shape, it is built up to obtain the correct form. Its cross section as shown in detail is self explanatory. The face is three pieces of ¼" sheet glued up, shaped and cut out as shown. The hole cut in the inner sheet is for the reception of the nose plug. The cylinders are given in detail and are cemented in place. The nose plug is 1" in diameter and 11/16" thick. It is shaped as shown and forms the crankcase. As it is to be removable, it should not be glued in place. The rear of the cowling is of 1/16" sheet. There are 14 cowl ribs. Three are attached at a time and checked for alignment as the work progresses. Their locations are to be found on the front view. The covering is of paper or wood veneer. The skirt is of 1/32" sheet balsa or veneer. The cowling is silver. The cylinders and crankcase are black.

Propeller and Motor

The propeller is cut from a block 8" x 1½" x ¾". The blank is first cut to the shape shown. The propeller is carved in the usual manner. Care should be given to the proper balancing to avoid vibration. Glue a ⅛" washer to the rear of the hub and another to the front of the nose plug to serve as bearing. The shaft of .028 wire is imbedded in the face of the propeller and passed through the hub and nose plug. A loose washer is placed on the shaft to reduce friction. The nose assembly is cemented to bulkhead K. Motive power is eight strands of ⅛" flat rubber.

Flying

The model should be tested over deep grass. If none is available test the ship R.O.G. with a few turns. A piece of lead is used to obtain the correct balance. The ship has a quick take off and is stable in flight.

Bill of Materials

2	1/16"x3"x24" balso—Bulkhead, wing ribs and in cowling
1	3/32"sq.x36" balsa—tail surfaces
7	1/16"sq.x36" balsa—stringers and windshield
1	¼"sq.x10" balsa oleo struts and block F
2	1/16"x⅛"x24" balsa—wing spars
1	⅛"sq.x24" balsa—leading edge
1	1/16"x⅜"x24" balsa—trailing edge
1	⅛"x¼"x36" balsa—wing struts
3	2¼"sq.x¼" balsa cowl face
2	4¾"x1 1/16"x1/16" balsa wing blocks
1	1/16"x1/16"x2 7/16" balsa—windshield block
1	1 1/16"x1/16"x1/16" balsa—tail plug
1	7/16"x3/16"x2½" balsa—tail wheel housing
1	8"x1½"x¾" balsa—propeller
4	1/16"sq.x15" bamboo—wing tips, tail edges and landing gear braces
1	6" .028 music wire
1	8" .034 music wire
3	⅛" washers
1	1 oz. cement
1	2 oz. clear dope
1	½ oz. yellow dope
2	sheets Jap tissue
1	pr. 1½" wheels
8	ft. ⅛" flat rubber
1	sheet cellophane
4	3" stars
1	6" 1/16" aluminum tubing

The Glider Grows Up—Part No. 2

(Continued from page 5)

extremely difficult to adjust the controls so this can be accomplished, not to mention the weight it entails when you get through. Finally, most tailless ships tend to be unstable longitudinally.

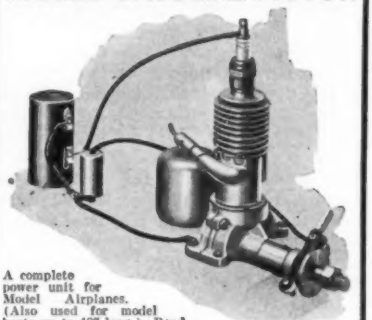
Lippisch got rid of all the difficulties at one fell swoop. He solved the rudder trouble by making the rudders independent of each other. When he wants to turn right, only the right rudder moves; for left, only the left rudder. The arrangement did away with the synchronizing difficulty and Lippisch found, to his delight, that by using them both together he had an air-brake that helped out his stability in a pinch. The aileron difficulty remained; it was solved by hinging almost the entire trailing edge of the wing and splitting it into three sections, the central portion being used as an elevator and the tips for ailerons.

With these changes the Storch flew beautifully. What was best of all, the controls proved effective in stalling positions; that is, the stall was practically eliminated as a source of danger. She operated so well, in fact, that Lippisch mounted a small 7-9 hp. engine in her for a trial as a powered plane, whereupon, she demonstrated her aerodynamic qualities by making 65 m.p.h. with this insignificant power plant. Immediately she was widely copied; many of the new Russian gliders are modified Storchs and at least two important airplanes have sprung from the design—the French Guerchais flying wing and the new Westland-Hill Pterodactyl in England, which has made such remarkable records. (The latter, incidentally, incorporates another glider feature in the one-wheel landing gear.)

But although the results were interesting, resistance to stall and efficiency as a powered plane were not the objects the glider experts were trying to attain. What they were trying to do, we will tell in a minute; meanwhile, let us look at the next radical change in design, Klemperer's Ente, or Duck. It goes right back to an idea the Wrights had tried—and dropped—in 1908, the idea of having control surfaces out in front of the main wings. Instead of providing another set of controls behind, as in the original Wright model, Klemperer boldly turned the whole machine around to fly tail-first. His theory was that the control surfaces would act as "feelers." Good glider pilots become very sensitive to changes in speed or direction of air currents; with these feelers projecting ahead, Klemperer reasoned they could detect changes in currents through the feel of the controls an instant or so before the changed breeze struck the wings and could swing the stick to take the best advantage of them.

The Ente has the disadvantage of requiring that its control surfaces carry a load, for the sake of longitudinal stability. This requires the pilot to hold onto his controls every minute, never allowing the slightest variation from the proper angle, and in practice, it makes the Ente a very wearying and nerve-racking craft to fly. Klemperer's Ente was, nevertheless, a considerable success, so much of a success that he was summoned to Hamburg to design a

PEERLESS
MODEL GASOLINE MOTOR



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powered Ente for the Focke-Wulf firm. The powered machine made several successful flights but there seemed to be some "bugs" in it and further experiment on the design was stopped by the depression.

Meanwhile, it was by no means dropped by the glider men, to whom the Ente represents the main hope of realizing their dreams. That characteristic of feeling its way into changes of current, letting the pilot know a second or two before they occur, is the big thing.

To understand what the dynamic soarer is, we must go back a few steps and remember that soaring pilots gain altitude, distance and flight speed, by riding with the rising currents of air that occur where the wind blows against a hillside or up under a cumulus cloud or toward the front edge of a stormcloud. The glider, having no power, is perpetually gliding downhill, but if the air is rising faster than it slides down, it gains altitude. Soaring, gliding, is just a matter of getting over the right kind of hilly country or flying during the right kind of weather conditions.

Glider pilots are not precisely delighted with this state of affairs. They want to be able to fly whenever and wherever there is a wind and here's how they propose to do it. Suppose there are two currents of air flowing past each other in opposite directions with a speed of 10 miles an hour. In current A there is a glider, flying at its normal air-speed of 35 m.p.h. going with the wind. The pilot suddenly switches his glider over into current B, which is coming in the opposite direction at 10 m.p.h. He has, therefore, increased his air-speed to 45 m.p.h. This extra speed he can put to good use by climbing for a short distance. When the glider has used up its extra speed on the climb, it is once more travelling at 35 m.p.h. but now in current B. The pilot turns and switches over into current A, now striking this head-on. Once more he has stepped up his air-speed to 45 m.p.h., and can climb again.

Thus the glider, without the aid of a hill or cloud, can ride right upward in a series of spirals. As a matter of fact, certain birds, particularly the albatross, use exactly this method and there is no reason why humans cannot do it, too, if they can become as sensitive to wind-currents as the albatross and if they have the right type of glider. It just happens that nobody has done it yet.

Wind that comes in puffs of varying intensity can also be ridden upward in the same fashion. To do it, two things are necessary (1) the right kind of glider and pilot and (2) wind that either comes in puffs or has streaks of changing direction in it.

Condition (2) is a fact; investigation has shown that no wind is really steady, it all comes in whirls and eddies or puffs. All that is now needed, then, is to fulfill condition (1). This is the reason for the invention of the Ente and the reason why it is the most hopeful glider yet produced, though it has no records to its credit yet. It is an effort to feel, since we cannot see, these changes in the air currents. If and when that effort is successful, you will be able to hop aboard a glider and go anywhere you please as long as the wind blows.

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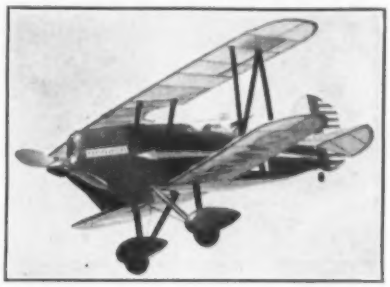

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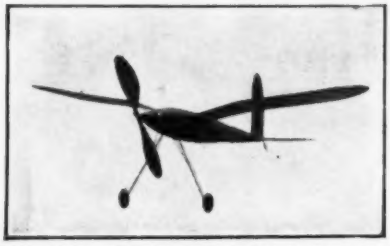

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Building a Light Outloop Tractor

(Continued from page 7)

wise to start at the wing tip with rib No. 6, measuring in toward the center to locate each rib. Of course, only half of the wing frame is to be built at a time. While the cement on the first half is drying, be sure that the wing is kept in a level position. Build the second half of the wing while the first half is drying.

It is wise, however, to cement the small pieces of balsa forming the tips of the wing in place immediately after finishing the framework. This semi-circular piece is a flat piece of balsa 1/32" thick. The grain should run parallel to the axis of the wing, not from front to back. It is cemented to the outside of the end rib in a straight line from leading to trailing edge.

The next operation is to fit and cement the two halves of the wing together so the proper dihedral angle is formed. To do this, sandpaper the ends of the wing spars of both wing halves so that they fit snugly together when the wing tips are raised 2¼" each.

While the wing tips are raised to the proper height, apply cement to the spar ends and join them together tightly. Allow the cement to dry while the wing tips are raised the proper amount. Be sure that the frame is not twisted while drying.

When all cemented joints are thoroughly dry, cement the thread trailing edge to the rear of all the ribs. It stretches from one wing tip along all of the ribs to the other wing tip.

Now cement small balsa blocks to the underside of the front and rear spars 15/16" out from the wing center, on both sides of center. These are shown by dotted lines across spars and on Rib No. 2.

Covering

Cover the wing with Jap tissue, the grain running from the leading to the trailing edge. First cut out the pieces which are to be cemented in place slightly larger than the outline of the wing. Half the covering should be cemented in place at a time.

Cover half the wing by starting at rib No. 1, cementing the paper to this rib. Then apply cement to the spars and to each rib, one panel at a time, pulling the paper from the center toward the tip and pressing it down to the frame. At the tip the paper should be stretched out and round the curved edge of the sheet balsa wing end. Cement it and curl the paper around the edge of the balsa.

When this is finished trim the leading edge and cement down the fringe of paper covering which will result.

Next cover the upper side of the other half wing in a similar manner. Do not cement the paper to the thread trailing edge at this time. When the top surface of the wing is all covered, proceed with the bottom surface in the same manner, starting from the center rib and working successively from ribs No. 1, 2, 3, etc., out to the tip. Trim the leading edge of the under-covering, cementing it in place.

Thread Trailing Edge

In order to cement the paper to the trailing edge, place a very small amount of banana oil along the edge of the underside covering of the paper, then press the two edges of the paper together over the thread. Do not attempt to curl the paper around the thread in any way. This makes a knife edge trailing edge. Trim it off so that it is even when the cement is dry.

Tail Surfaces

The framework of the stabilizer is made of small strips of balsa, medium grade, as shown in the drawing. Cement them together as indicated by the measurements. Two sheet balsa pieces form the curved ends.

The rudder is made in a similar manner.

When both are finished, cement the paper covering to the top of the elevator commencing at the center rib, stretching the paper toward the tips and cementing it to the frame. Trim the edges. The rudder is covered in the same manner, the paper being applied to the right hand side.

Wire Parts

Make the wire parts as indicated on the drawing. All but the wing clips are made of 1/32" (.032) wire. The clips are of .020 to .026 wire. A little observation will indicate how these parts are to be formed. The tail skid is full size as is the propeller shaft. Do not turn up the end of the propeller shaft until the propeller is assembled on it. Hold the propeller bearing in place to the underside of the stick and the landing gear to

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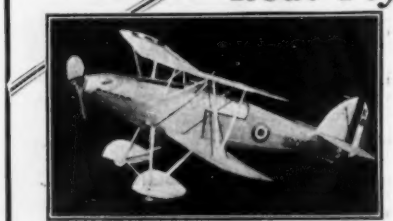

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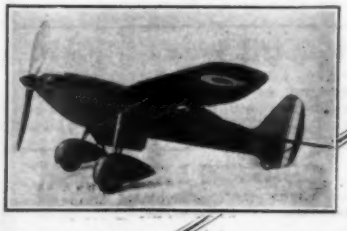


the side of the stick by binding them with thread to the stick. Before wrapping the parts with thread, apply plenty of cement to them.

The bearing for the propeller may be purchased at any model shop. It is merely a bent strip of metal with a hole at the end. Before putting the landing gear in place, it will probably be wiser if you slip the wheels on the ends of the axles and bend up the axle ends. The wheels should be made of hard balsa with two washers cemented to the wheel, one at each end, directly over the axle hole. The washers may be made of brass, 3/16" in diameter. The hole should be just large enough for the axle.

Now you put the wing clips in place. Be sure that they have been made carefully to the measurements shown. The rear clips should be 1/8" shorter than the front ones. There should be a rear right and a rear left clip, and a front right and a front left. The ones shown in the drawing are left hand clips. To make right hand clips, the ends of the wires where it joins the wing, should be bent around in the opposite direction.

You will note that there are little prongs which extend upward at this end of the clip. To cement the clip to the wing, press the prongs at the ends of the clips up into the blocks which are cemented to the bottom of the spars. These blocks are indicated by dotted lines, running across the spars. The front view of the wing shows the position of the clips. Be sure that plenty of cement is applied over the wire of the clips where they run parallel and close to the bottom of the blocks.

The "U" part of the clips should line up perfectly with one another so that when the wing is in place upon the stick in the position shown on the drawing, the stick fits down into the "Us" of the clips, front and rear. When the cement on the clips is thoroughly dry, you may put the wing in place by spreading the clips at the bottom and letting the stick slide up between them, then pushing the stick down into the four "Us" of the clips.

A rubber band should be hooked around the hook of the clips, stretched across the top of the stick, bent under the opposite hook, across the top of the stick again, back to the original side, and looped over the first hook. The band should be a very small one, about 1/4" long. If the band is longer, it will be necessary to wind it around the hooks twice.

Cement the tail skid in place by forcing the prong through the motor stick immediately in front of the elevator, pressing the part tight to the underside of the stick. Apply plenty of cement over it. Eleven inches from the front end of the stick, cement the can to its underside as shown in the drawing. The "U" part of the can should fit tightly to the undersurface. Apply plenty of cement so as to be sure to hold it in place.

Cement the rudder to the top of the elevator, making sure that it is perpendicular to the elevator surface. When this is dry, cement the whole assembly to the top rear end of the stick. Now you have your plane finished except for the propeller.

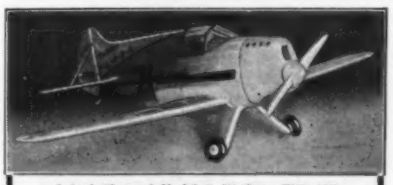
Propeller

The propeller is cut from a block of balsa 8" long, 1/2" wide and 3/4" high. A medium hard or hard grade of balsa should be used. Draw diagonals from all corners of the block, as shown in the small drawing. Cut away the upper right hand edge of the block and form a surface between the upper left hand diagonal and the lower right hand diagonal, indicated by the dark line drawn inside the block in the drawing. The dark line shows the curved end. Ignore this for the present. Cut the surface so that it extends straight out to the block end. The diagonal line on the end of the block indicates where this surface strikes the end of the block.

Cut this surface so that it is slightly hollow or concave. This is the rear or thrusting side of the blade; the one facing the rear of the model. Sand this down so that it is fairly smooth. Then cut the other end of the block in a similar manner. When this is finished, round down the back side of the blades, cutting away the wood until the blade is 1/16" thick at the tip and about 3/16" at the hub.

By using the pattern shown in the graph enlarged to proper size, trace the outline of the propeller blade on one end of the propeller. Cut the edge of the propeller blade away to this line, making a hollow at the hub in the rear edge of the propeller. The side view of the frame shows how this hollow looks. When the propeller is roughed out, sand it down so that all surfaces are smooth and so that the edges are fairly thin, but slightly rounded.

Now determine the exact center of the propeller and force a pin straight through the hub. This forms a shaft hole. Over this hole, at the rear of the propeller, cement a washer so that the hole in the washer and the hole in the hub coincide. Over the front edge of the hole cement a brass eyelet, shaped as indicated in the drawing, with a small notch in its rim. This is to act as a ratchet for free wheeling.



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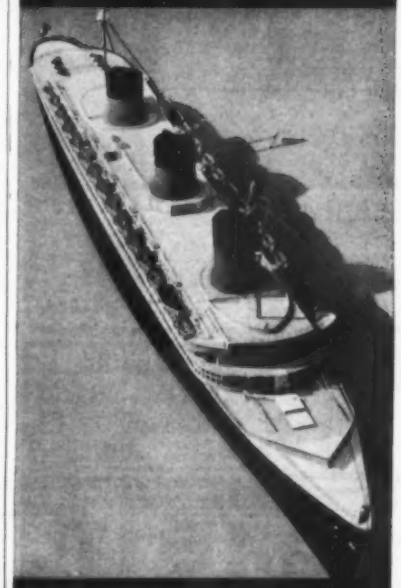

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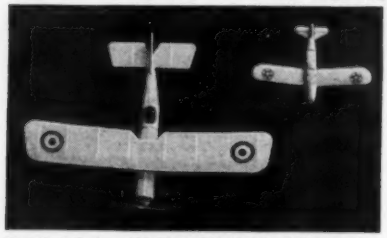

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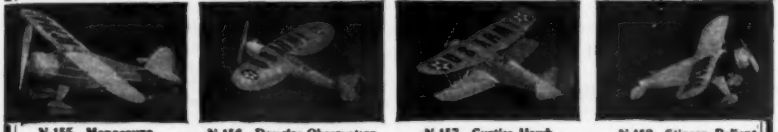

N-155 Monocoupe | N-156 Douglas Observation | N-157 Curtiss Hawk | N-159 Stinson Reliant

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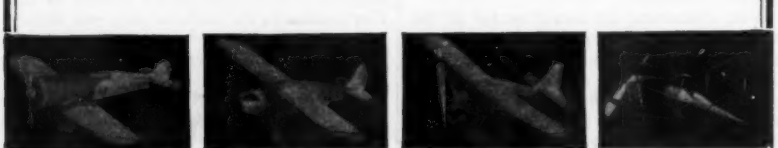

NC-151 Wedell-Williams 17½" wing spread | NC-152 Fairchild 24 20" wing spread | NC-153 Bellanca 20" wing spread | NC-154 SE 5A 15" wing spread

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Now pass the straight end of the propeller shaft through the hub of the propeller from rear to front, bending over the end of the shaft as indicated by the dotted line in the drawing. This acts as a finger which catches in the ratchet while winding.

After the propeller unit is complete pass a washer over the loop end of the propeller shaft. Then slip this loop end through the hole in the propeller bearing and push the propeller back into position, the shaft extending to the rear.

Now your ship is nearly ready. All that you have to do is to string the motor in place. This motor is composed of ten strands of 1/16"x1/30" or five strands of ⅛" x 1/30" brown rubber. It should be well lubricated. No "S" hook is shown at the rear where the rubber hooks to the tail skid. See drawing. Without a hook the machine may be wound by hand only. If you wish to wind it with a winder, string the motor through an "S" hook at the rear, which in turn is hooked to the tail skid.

Now, before you fly your ship, make sure that the front edge of the wing is at least ⅛" to 3/16" higher than the rear edge. Measure this from the leading and trailing edge down to the stick to determine this wing setting. The front to rear position of the wing on the stick is about correct as shown in the drawing. However, determine the center of gravity or point of balance, and then measure the wing so that the rear clip is about ¾" to the rear of the center of gravity. Do not let the position of the center of gravity surprise you. This plane is unusual in this respect.

Hand wound, the motor may be wound 600 times. Winder wound, it may be wound 900 times.

The ship may be tested out for balance in a small open space. However, do not attempt to fly it in any place which is not free from obstructions, especially trees. The ship makes long flights at a high altitude.

We will be pleased to hear of your results after you have built and flown it.

A Scale Model for Beginner or Expert

(Continued from page 21)

and their outlines traced; or tracing paper may be used to transfer the outlines of these patterns onto the wood. The use of the latter method is advisable so as not to mutilate the page.

The rudders and elevator have been increased in area slightly for greater stability and to insure lengthier glides. However, the model is scaled 3/16" to the foot.

The first step is to cut out all the main parts. The cabin windows and door outline are left in white for painting. The white designs on the cowling show the positions of the rocker arm streamlines on the real ship but are painted on your model in the manner shown.

Make the wing first, letter A. The letter I shows the pattern of the wing rib of which two are needed; the wing being cut from 1/32" thickness balsa is flexible enough but these ribs are added to retain the cambered wing effect. The white dotted lines shown by letter T designate the exact position for the ribs. Apply a little cement along the tops of the ribs and curve the wing over them. Then place an object —not too heavy—over the wing to hold it in its curved position until the cement has hardened. When this procedure is completed, find the exact center of the wing, crack it slightly, give it a dihedral of 1/16" and set aside to dry.

The fuselage, letter B, is next. Cut this out carefully. The outline from the front cabin window continues along the black line separating the wing curve from the rib as far as the trailing edge. Notice the overlapping portion of the fuselage which fits over the top of the wing outline. Cut out the slot for the elevator. The wing and elevator may be cemented in their respective positions as soon as the fuselage is completed. Shape two pieces of wood of the size shown of the rocker arm streamlines and cement in position on top and below the cowling.

The landing gear is next to be made and is cut from 1/16" balsa sheet. Make two pieces of each part, letters E, F and G. The wheel pant and wheel is one affair. Round off these pieces smoothly with fine sanding. The fillet pieces shown by letter G are tapered down to 1/32"; the thickest part being cemented flush to each side of the body at the angle shown in the front view drawing. Next, cement to

each side of the fillet piece at the angle shown, the landing gear strut shown by letter F. When this has dried, cement to each side of the landing gear struts the wheel pants shown by letter E. See front and side view drawings.

The wing struts shown by letter K are cut from 1/16" sheet balsa to proper length and width. Four struts are necessary. The forward and rear struts are cemented at joints X where the landing gear struts meet the fillet piece and also at the point of contact with the wing rib. See front view drawing. Note also in the side view the slanting position of the rear strut. Another set of wing struts shown by letter N is next to be cemented in vertical position. There are four in number and each are cemented as shown in the front view drawing. The rear N struts are placed directly in line with the front ones.

Next, place the inter-brace struts, letter V, between the forward and rear N struts and cement. See side view. This is done on both sides of the wing.

The rudder, letter D, should be cemented in place. Next cement the stabilizer brace struts as shown by letter J. Attach the tail wheel, letter L, in position. The wire launching hook, letter H, is cemented underneath the fuselage. Reverting to points X, it is suggested that you apply a good coat of cement around the joints for strengthening as these parts are subject to abuse. For the nose weight, lead foil is suggested and by a little experimenting you can determine the correct amount to cement at the front of the cowling. Lead foil is obtained from smoking tobacco packages. If this is not obtainable, a small paper clip will do the trick just as well. The prop, letter M, is shaped from 1/16" balsa sheet. Mount to nose with a small pin.

The following is the color scheme of the model shown in the photograph and a very attractive one it is. The leading portion of the wing is white and the rear red. (This is the well-known Stinson characteristic.) The fuselage is white with black striping. The rudder is white with red outlines. The cowling is a bright green with the rocker arm streamlines in yellow. The fillet pieces and landing gear struts are white while the wheel pant is red. Tires are black. The elevator is red with white outlines. The windows are black with the door outlined in black.

The Aerodynamic Design Of The Model Plane

(Continued from page 27)

This means that if the torque developed by a motor of *one* strand is (1.00) inch ounces, a motor of twice the cross section area, or one of *two* strands will develop (2.8) inch ounces, almost three times as much.

The general impression is that the power, or turning effort, of a motor is proportional to the number of strands of a given size in a motor. Most model builders unthinkingly consider the power of their motors on this basis. It is obviously not correct if all the facts are carefully studied.

These disclosures should stimulate enthusiasm for the results are actually better than many model builders believe them to be. Apparently they are getting something for nothing, which procedure always fills our hearts with joy.

Effect of Stretching and Winding Motors

A point of great interest to builders is in the result of stretching motors when winding them. By doing this with lubricated motors the maximum torque is increased an amount equivalent to adding 33% more strands, or 33% greater cross section area to the motor.

This means that if you have a motor of eight strands of lubricated rubber and stretch it while winding it, you will obtain as much maximum torque as if you used six strands of lubricated rubber and wound it without stretching it.

As in the case of the formulae for turns, this relationship for torque is only approximate, but it serves to show the basic mathematical law which governs the torque produced by any motor. The torque of different motors will vary from this relationship slightly but to no great extent. If we check over some of the values shown in the torque tables given in this article, it can be seen how closely they follow it. For example, consider the maximum torque value for a *two* strand motor of 1/8"x1/30" dry brown rubber.

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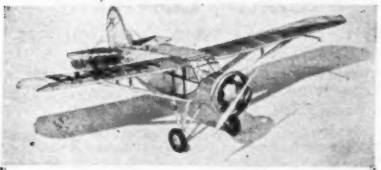

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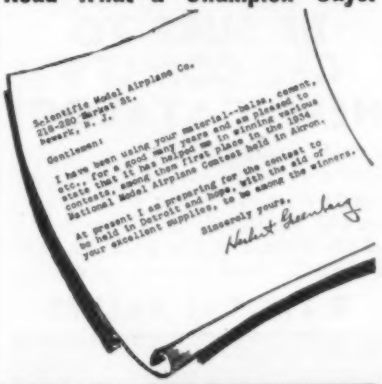
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1/8x3/16...3 for .05
1/8x1/4...3 for .05
1/8x3/8...03
1/8x1/2...04
3/16x3/16...2 for .05
1/4x1/4...05
1/4x1/2...04
3/8x3/8...05
3/8x1/2...07
3/8x1...09
1/2x1/2...08
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3/16x2...09
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5/8x1x9...04
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Per doz...05
Per gross...50

Thrust Bearings

Small size—.025" hole
Each...02
Per doz...20
Large size—.035" hole
Each...02
Per doz...20

Winders

Strong and durable. Can be used on either indoor or outdoor models...30

Model Making Pins

1" length T pins
package of 80...10
1/2"...100...10

Aluminum Cowlings Closed Face

1" diam...15
1 1/2" diam...15
2" diam...20
3" diam...30

Open Face

1" diam...15
1 1/2" diam...15
2" diam...20
3 1/2" diam...40

Anti-Drag Rings

1" diam...12
1 1/2" diam...15
2" diam...20
3" diam...30

Brass Washers

Per doz...05
Per gross...20
Per thousand...1.35

Aluminum Tubing

1/16" O.D., per ft...10
3/32" O.D., per ft...10
1/8" O.D., per ft...10
5/32" O.D., per ft...15
1/4" O.D., per ft...15

Sheet Aluminum

.001", per sq. ft...15
.002", per sq. ft...15
.003", per sq. ft...15
.005", per sq. ft...30
.010", per sq. ft...30

Balsa Wood Pants

Shaped and polished
2" for 3/4" wheels, pair...15
2 1/2" for 1" wheels, pair...15
3" for 1 5/8" wheels, pair...20
4" for 1 7/8" wheels, pair...30

Ready-Made Balsa Propellers

True-pitch, with drilled center for shaft

6"	.05	10"	.12
6"	.06	11"	.15
7"	.07	12"	.20
8"	.09	13"	.25
9"	.10		

Propeller Shafts

1 1/4" long...4 for .05
1 7/8" long...3 for .05
6" long...2 for .05

Wood Nose Plugs

Nose plug for models with 18" to 30" wingspan. Special low price, each...01

IMPORTANT. Add 15c for packing and postage on all supply orders.

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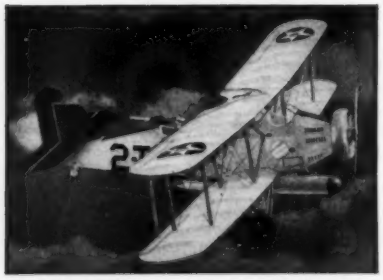
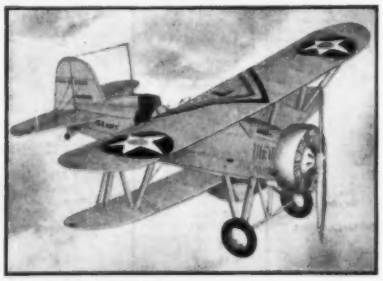
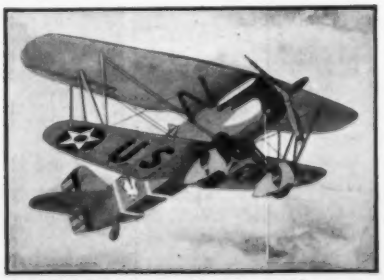
3 TYPICAL VALUES



MARTIN TORPEDO (Kit No. 510) 50c
Wingspan 18" .....



BOEING F4B-4 (Kit No. 512) 50c
Wingspan 15" .....



CURTISS HAWK P6-E (Kit No. 513) 50c
Wingspan 15½" .....

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It is (1.005) inch ounces. A four strand motor of this same rubber delivers a torque of (2.678) inch ounces. This is a torque relationship of about (1.00) to (2.68); quite close to the values of (1.00) to (2.8) given by $N\sqrt{KN}$. For lubricated brown rubber of this same size, the torque for *two* strands is (1.203) and for *four* strands (3.21) which is a relationship of about (1.00) to (2.75), even closer to the theoretical value.

Variation on Stored Work

As has been indicated previously, the model builder has been prone to think that doubling the strands in a given motor cuts the possible turns in half and doubles the torque. Let us see where this assumption leads us.

Under these conditions the propeller of a model will turn over half as many times during the flight if four strands are used instead of two, but twice the power will be developed. This means that four strands will fly a model of twice the weight, one half as far, or that the work expended by the four strand motor is exactly the same as the two strand motor; for, *turns times the torque equals the work expended.* Obviously the original premise is not true, for a motor of twice the amount of rubber as another one will deliver more than the same amount of work. The amount of turns possible if the strands are doubled have been shown to decrease in a ratio of from 1 to 2/3, or 33%. It has been shown that the torque increases from 1 to 2.8, an increase of 180% or 80% more than double the original torque. But, if our first premise is not true, how does the work vary with the number of strands? We know that the turns vary approximately as $\sqrt{\frac{K}{N}}$, and that the torque varies as $N\sqrt{KN}$. The work being the produce of the torque times the turns, the work expended then equals $\left(\sqrt{\frac{K \times N\sqrt{KN}}{N}}\right)$, or $KN\sqrt{\frac{N}{N}}$ $D = KN\sqrt{1} = KN$, or N, when K = 1.

In other words the work varies as $(N)\sqrt{1}$, increases or decreases in direct proportion with the number of strands. If the number of strands in a motor are doubled, the amount of work the motor can deliver is doubled. This occurs from a theoretical point of view. Actually from tests, the work does not increase quite as much as indicated by this theory, though very nearly so. The variation of friction with different tensions on the bearing and friction between different numbers and sizes of strands cause the actual results to differ slightly from the theoretical.

By examining the work values shown in the tables on page 27, you will see that approximately, the work is proportional to the number of strands. There is a slight variation from this relationship throughout the tables, but generally speaking, the variation is not great.

In previous articles formulae were given which showed that the work varied approximately as $K\sqrt{N}$. In combination with the constant (K) this relationship is fairly accurate. However, further research has been made and formulae evolved from the observations which give more accurate results. The answers given by the two sets of formulae vary only slightly; chiefly in the values which they give for four, six and eight strands and over twelve strands. The revised accurate formulae for work in inch ounces per inch of motor delivered by rubber band motors are as follows:

For dry brown rubber of strands 1/8"x 1/30", W = 25 (3.5N − 1).

For lubricated unstretched brown rubber motor strands 1/8"x1/30", W = 25 (4.1 N + 2.3).

For lubricated and stretched brown rubber motor strands 1/8"x1/30", W = 25 (8.5 N − 3.5).

For strands 3/32"x1/30", W = 25(5 N + 1.5).

For strands 1/16"x1/30", W = 25(3.6 N + 1.8).

For strands 1/32"x1/30", W = 10 (4.75 N + 0.5).

Formulae which give work delivered by black rubber motors, in inch ounces per inch of motor are as follows:

For dry rubber motors strands ⅛"x 1/30", W = 25 (2.9 N + 2.6).

For strands 1/16"x1/30", W = 12.5 (2.1 N + 6).

WHO WON THE BIG JR. BIRDMEN CONTEST?

WHY, THE BOYS WHO USED MRL SPECIAL BROWN RUBBER, OF COURSE!! Walter Getsla, Herbert Greenberg, and Roderick Doyle, Winners of 1st, 2nd and 3rd, ALL had MRL SPECIAL On Their Prize Models!

All The N.A.A. Records Are Held By Models Using This Wonderful Special Rubber! It Gives A Smooth Steady Flow Of Power! No Matter What Anyone Tells You About Black Or Brown Rubber, MRL SPECIAL Still Holds ALL The WORLD RECORDS, And WINS ALL The BIG CONTESTS! Stop Handicapping Your Models! If You Want REAL Flights, You Want MRL SPECIAL!

1/32—25 ft. 5c	225 ft. 30c	1/ 8—7½ ft. 5c	225 ft. 70c
3/64—18 ft. 5c	225 ft. 35c	9/64—6½ ft. 5c	225 ft. 75c
1/16—14 ft. 5c	225 ft. 40c	5/32—12 ft. 10c	225 ft. 85c
5/64—12 ft. 5c	225 ft. 50c	11/64—10 ft. 10c	225 ft. 90c
3/32—10 ft. 5c	225 ft. 60c	3/16—10 ft. 10c	225 ft. 95c
7/64—8½ ft. 5c	225 ft. 70c	1/ 4—7 ft. 10c	225 ft. $1.20

All Sizes 1/30" Thick; Small Tube Lubricant FREE With Every Order!

SPECIAL BROWN RUBBER LUBRICANT

used by the experts for getting those really long flights! Will double your hand winds, or we'll return your money! Absolutely guaranteed to be the best!
4" tube—10c; 3 oz. can—only 30c; 8 oz.—only 65c

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from a newly perfected formula! Makes strong, flexible, non-sticky, evenly colored red and green sheets! You can't miss—directions right on every can!
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the strongest, fastest-drying colorless cement, true MRL quality! Dries on the model, not in the tube!
¼ oz.—5c; ¾ oz.—10c; 3 oz. nozzle tube—30c

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of 225 ft. of ¼" MRL SPECIAL RUBBER, 42 ft. of 3/32", and 3 ounces of Lubricant—only $1.00

Your Dream Ship

Altitude! - Speed! Distance! - Duration!

For All-Around Sport Flying!

The Cee Gee Special Designed by Carl Goldberg is The Last Word in Performance.

Each Kit contains Complete Materials to Build Two Models and Includes Two Machine Cut Props, Extra Motors of MRL Brown Rubber, 12 Large Printed Balsa Sheets, Cement, Wire and Fittings, Full Size Plans, Very Complete Directions, Etc.
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For strands 1/32"x1/30", W=5 (3.2 N+7.1).

For lubricated rubber motors strands 1/8"x1/30", W=25 (2.9 N+3.7).

For strands 1/16"x1/30", W=25 (1.2 N+2.6).

For strands 1/32"x1/30", W=5 (3.6 N+4.3).

For lubricated and stretched motors strands 1/8"x1/30", W=25 (6.8 N+2.7).

For strands 3/32"x1/30", W=25 (4.5 N+5.2).

For strands 1/16"x1/30", W=12.5 (8.3 N−3.8).

For strands 1/32"x1/30", W=5 (4.6 N−1.5).

The simplicity of these formulae makes them easy to solve. An example is as follows:

It is desired to determine the amount of work delivered per inch of motor, by a brown rubber motor of four strands, size 1/32" x 1/30", lubricated and stretched.

The formula is: W=10 (4.75 N+0.5). Then, W=10 [(4.75x4)+0.5], or W=10 (19.0+0.5) = 10 (19.5) = 195 in. oz. of work.

You will notice that this amount of work is about *double* the amount delivered by two strands, indicated in the tables. Thus the rule, that the delivered work is about proportional to the number of strands of a given size in the motor, (or to the cross section area of a motor) is proved to be true.

It was hoped that our space would allow us to consider the capacity of multiple motors for turns, torque and work and their value compared to single motor drives, but it will be necessary to leave this interesting explanation until the next article of this series, which will appear in the August issue of MODEL AIRPLANE NEWS.

Airplane Observers Contest

(Continued from page 11)

Cash awards will be paid as follows: First place award $15; second place, $10; third place, $5; fourth, fifth, sixth and seventh places, $2.50 each; eighth to seventeenth inclusive, $1 each. In the event of ties, duplicate awards will be made.

The names of the winners and the correct answers will appear in a following issue of MODEL AIRPLANE NEWS.

If you do not wish to destroy the magazine by cutting out the coupon, you may make and submit one of a similar size and shape, drawn in ink.

This contest is open to all except the production staff and paid contributors of MODEL AIRPLANE NEWS.

Entering the contest automatically signifies that the contestant accepts the decision of the judges as final.

Result of the first contest will appear in the August issue.

Air Ways—Here and There

(Continued from page 37)

Bamberger Aero Club

The Eighth Annual Indoor Contest was held at the 113th Infantry Armory, Sussex Avenue, Newark, New Jersey, on Saturday, March 30th. The events were directed by Mr. Nathan Polk, director of the Club. This contest was important inasmuch as it decided the champion who would represent the club at the National Competition to be held in St. Louis, Missouri, on June 27, 28 and 29. The winners won on a point system. The points were accumulated from this contest and one previously held in the winter.

William Sherwood was the lucky boy to win the trip to St. Louis. All his expenses will be paid by the Club. Sherwood won the Endurance Event in the last contest with a time of seven minutes, twenty-four seconds.

Picture No. 15 shows Mr. Nathan Polk, at the left, awarding the trophy to Bill Sherwood for his accomplishment. The award of the trip to the "Nationals" is evidently responsible for the broad smile.

Four Aces Model Aero Club

A very unique model airplane club is in existence in Huntington, W. Va. It is sponsored by Mr. Merrill W. Fox and is composed of only four members. They call themselves the Four Aces Model Aero Club. They are Merrill W. Fox, Earl Thornton, Bernard Baribeau, and Howell Curtley. The club members plan to attend the "Nationals" and are preparing now in order to put up a fine show. Thornton has

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If not ordering complete group, for 10c each PLUS 5c EACH for handling. Order from list at right. Send cash, check, or M.O.—no C.O.D.'s or stamps. Don't wait—rush your order TODAY

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DUAL PERFORMANCE

Flight tested by Prof. T. N. de Bobrovsky. Material for two complete wings. One with Gottingen 387 Wing Section for climb and endurance—M-6 Section for speed and distance. This model is the result of nearly a year of experimental work and for consistent flying this model is in a class by itself.

Flights of over 4000 feet have been made during the flight testing.

Wing span 36 in.; length 24 in.; weight 3 oz. Full size plan, wing ribs cut and notched. Nose block shaped and drilled for 1/16 inch tubing. Special Douglas-designed prop., shaped out. Sheet celluloid for cabin windows, two colors of tissue, all strips cut to size, parts requiring sheet balsa printed out, glue, clear dope, and motor rubber, and free wheeling prop. device.

COMPLETE KIT WITH M & M AIRWHEELS $1.75 P. P.

One of the Hundreds of Letters We Receive

Feb. 18, 1935.

Douglas Model Aircraft Co.,
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Gentlemen:

I am enclosing a couple of photos of the Fairchild "22" which I built from your kit. May I say that it is the finest example of a model kit that I've ever seen. The detail of construction is wrought to perfection, and those wonderful pneumatic tires give it the final touch. I nearly always design my own planes, but once in a while I have the desire to build a flying scale job, and when I built this plane, it was one I can be proud of. Thanking you for a fine kit value, I remain,

Aeronautically yours,
ELBERT J. WEATHERS, San Diego, Calif.

P.S.—I would greatly appreciate a price list on your supplies.

Gas Model Builders Write for new Price List on Gas Model Materials, hard balsa, spruce, western pine, Alaska and Wash. Cedar, Strips and Sheets, 3-ply veneer, cedar sides, balsa center 1/16" thick and up. Special Feather Weight Silk for covering large Models. Glue, Dopes, Aluminum tubing, and sheets, etc.

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For Gas Models. 3½"x1¾" Wt. 2 oz. For Models up to 10 lbs. $2.50 Per Pair Postpaid. 4½"x1¾". Wt. 4 oz. For Models up to 20 lbs. $4.50 per pair postpaid.

For Rubber Powered Models 1¾", 1¾", 1¾", 1¾". Wt. 1/10 oz. 50c Pair Postpaid. 1¾", 2", 2¼", 2½", 2¾", 3". Wt. 4 oz. 60c Pair Postpaid.

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Span 30". Length 25". Wt. 2 oz. Kit contains full size plans, wing ribs notched and cut to shape, body formers and other parts clearly printed on "AAA" balsa, turned spinners, glue, dope, red tissue rubber motor, special designed real FREE WHEELING PROP. CUT TO SHAPE. WORKS perfectly every flight.

Complete Kit only $1.50 P.P.

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2nd—H. L. Kelley, Jr., 1904 Burwell St., Bremerton, Wash.
3rd—Richard Debarganse, 2919 Forbes St., Jacksonville, Fla.

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DEALERS—Send for Wholesale price list. Discounts high as 50%. Kits; supplies. Art's Supply, 215 Mountain, Arlington, Mass.

FREE—Cement Coupon with price list and manual, 3c. New Kits; supplies. Art's Supply, 215 Mountain Ave., Arlington, Mass.

CAMPS! Send for complete new summer list. High quality at low prices. Berkeley Model Supplies, 53 Berkeley Place, Brooklyn, N. Y.

MANUFACTURERS. Jobbers, write on letterhead for model airplane supplies. Diamond Importing Co., 915 Saratoga Ave., Bklyn., N. Y.

NEW Design 5" pyralin propellers, very light, very strong, very efficient, complete with shaft, 10c p.p. Dealers wanted. E. A. Freund Model Airplane Co., 934 Highwood St., Iowa City, Iowa.

FOR SALE! Complete machinery for Model Airplane Shop: 1—8" circular saw; 1—10" circular saw; 1 band saw; 1 blower; 4 motors. Send stamp for complete information. D. Lehrer, 1466 Coney Island Ave., Bklyn., N. Y.

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MAN—Over 10 years experience designing, building and teaching of Model Airplanes, offers his services to a progressive firm anywhere. Best references. Anthony J. Tridico, 2604 Bedford Ave., Brooklyn, N. Y.

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THIS ad is worth 25c! Next month we advertise our $1.50 5-foot all Balsa Soaring Glider. Send this ad with your order and receive Glider for $1.25, saving 25c. (This offer good only till June 25th.) Woburn Model Airplanes, 19 Belmont Street, Woburn, Mass.

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ARMY Air Corps gives free flying training, salary, expenses paid. Information pamphlet, how to qualify, apply, 20c. Used airplanes, Gliders, $40 and up. Literature 10c. Continental, Box 344, Dept. 16, Indianapolis, Ind.

DON'T Buy Anything until you get Ort's new 1935 Aviation Material Catalogue. Prices are lower. Send this dime today. Karl Ort, 605 W. Poplar, York, Pa.

a gas job which will be entered.

Illinois Model Airplane Club

News comes from the Illinois Model Airplane Club, of which Walter Getsla is the president, Leonard Gageillo is vice president, Walter March is secretary, and Alvin Anderson is treasurer. The club director is Walter Brock. The contest committee is Walter Getsla, William Gough, Robert Kaergard. Members of this club are very active and placed in all local contests in which they entered.

There used to be a club with this same name which was quite famous. We wonder if the present club has any affiliation with, or is an offspring of, the old Illinois Model Airplane Club.

Findlay Model Aviation Club

The Findlay Model Aviation Club has been formed in Findlay, Ohio. The organization started with a membership of 35. A major contest will be held this year under the auspices of the American Legion. Anyone in the neighborhood of Findlay who is interested in joining this club should write to A. B. Fruchey, 634 Center Street, Findlay, Ohio.

American Legion Contest

Tom McCartney, twenty-year old McMechen, W.Va., boy won the recent scale model contest sponsored by the American Legion, Wheeling Post No. 1, at the Y.M.C.A. Some of the models entered in the contest were put on exhibition. They are shown in picture No. 16 in a very formidable layout. Most of them were very beautiful jobs. A trophy was awarded to the winner.

Soaring Society of America

For the benefit of model builders who may wish to know about glider clubs throughout the country, the list of the clubs associated with the Soaring Society of America, Inc., follow:

A.B.C. Glider Club, Ford Airport, Dearborn, Mich.
Aero Club Albatros, Building No. 30, T. A. Edison Industries, West Orange, N.J.
Aeronautical Engineering Society, M.I.T., Cambridge, Mass.
Air Hoppers Glider Club, 29 Astoria Boulevard, Astoria, L.I., N.Y.
Air Riders, Elmira, N.Y.
Akron University Glider Club, Akron, Ohio.
American Glider Association, Los Angeles, Calif.
Arnot Glider Club, Elmira, N.Y.
Ace Glider and Soaring School, Wyckoff, N.J.
Baltimore Glider Club, 813 West Barre Street, Baltimore, Md.
Buffalo Glider Club, 19 Fairchild Place, Buffalo, N.Y.
Carr's School of Gliding, 401 North Sheridan Avenue, Ottumwa, Iowa.
Case Aero Club, 14624 Armin Avenue, Lakewood, Ohio.
Coney Island Glider Club, 558 Maple Street, Brooklyn, N.Y.
Coatesville Glider Club, Coatesville, Pa.
Corning Glider and Soaring Club, Corning, N.Y.
Dartmouth Flying Club, Hanover, N.H.
Detroit Glider Council, 15100 Woodward Avenue, Highland Park, Mich.
Easton Glider Club, Easton, Pa.
Franklin Glider Club, Greenfield, Mass.
Gardner Glider Club, Gardner, Mass.
Intercourse Glider Club, Intercourse, Pa.
Kent Roosevelt Glider Club, Kent, Ohio.
Langley Aero Club, 23 Central Place, West Orange, N.J.
LaPorte Aero Club, LaPorte, Ind.
Laurence Tech Soaring Society, Detroit, Mich.
McGill University Glider Club, 1545 Mackay Street, Montreal, Canada.
Monmouth Aero Club, Admanston, N.J.
New York Gliders, New York City.
Oil City Glider Club, Oil City, Pa.
Purdue Glider Club, West Lafayette, Ind.
Queens Gliding and Soaring Ass'n, 7816-79 Place, Glendale, L.I., N.Y.
Roanoke College Aeronautical Club, Roanoke, Va.
Roxborough Glider Club, Roxborough, Pa.
South Shore Glider Club, Scituate, Mass.
Springfield Glider Club, Springfield, Vt.
Stevens Tech Glider Club, Hoboken, N.J.
University of Michigan Glider Club, Ann Arbor, Mich.
University of New Hampshire Glider Club, Durham, N.H.
Warwick Glider Club, Warwick, N.Y.
Washington Glider Club, Washington, D.C.
Wings Glider School, Blue Bell, Pa.
Western Hills "Y" Albatros Glider Club, Cincinnati, Ohio.

CORRESPONDENTS

Here are more boys who would like to correspond with other MODEL AIRPLANE NEWS readers:

Josef Feder, 2618 South 6 Street, Philadelphia, Pa.

D. E. Bianchi, 21 Twickenham Road, Teddington, Middlesex, England.

Harry Paul, 1135 Queen Street, South Bend, Indiana.

How To Make Clark "Y" Wing Sections

(Continued from page 32)

dot 3.5 units up from the base line at the 0% station. The 1.25% point on the table reads 5.45 upper ordinate, so we make a dot 5.45 units up on the 1.25% station. The lower ordinate reads 1.93 on the table at the 1.25% point, so we make this point up from the base line. Follow the same method until all the ordinate points are on the wing section plan. Connect these points with a continuous line, using a mechanical or "French" curve if possible.

In order to learn something from building and flying models, don't be satisfied to use a curve that "looks like" a certain curve. Try to make the curves as near perfect as you possibly can. In this manner, you can make a reasonably accurate comparison between different wing curves and design your models accordingly.

LILLIPUT LIGHTING KIT

Here's Something New for Airplane and Ship Models:

Note Navigation Lights

Now you can wire up and illuminate models with real navigation lights.

Genuine Midget Electric Bulbs, only 7/32" diameter, burning on any 2 cell battery.

CONTENTS OF KIT: 3 Lilliput Pea-Lamps, 1 red, 1 green, 1 white, each with 22" specially thin flexible wire-cord; 1 miniature base connecting-plug to fit any flashlight or electric lantern or penlite; instruction sheet with diagrams for wiring and installing.

If Local Dealer cannot yet supply we will mail you complete Kit postpaid for 85c

Satisfaction Guaranteed

HELIOS PRODUCTS CORP.
799 Broadway Dept. M7 New York, N. Y.

APPROVED BY "JUNIOR BIRDMEN"

A FLYING RECORD BREAKER

38" WINGSPREAD KIT $1.00 POST PAID

AIR SCOUT

Will Fly Over 500 Feet If Built According to Instructions
Simple to Construct
Crash Proof

DEALERS—Write for DISCOUNTS

ROBERT C. MORRISON MODEL CO.
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FLY BETTER—COST LESS—CONTAIN MORE—ALL HIGH QUALITY—ACCURATE for EXPERTS—EASY FOR BEGINNERS

Build planes that are 1/3 the size of real passenger carrying planes. Each model is a strong outdoor flyer!—a $10.00 value for only $1.00! Everything is in the kit including necessary liquids—nothing else to buy! There is no catch! Over 10,000 of these models have been sold and built (proof of this in our files). We have received highest praise from model builders for giving such tremendous values. Inspect our kits at any dealer. Read for yourself what each kit contains. Nothing we say here could fully describe how wonderful these kits really are! Send your order today! In a few days you will be the owner of a beautiful flying scale model that will make you the envy of your schoolmates and neighborhood.

5 FT. FLYING SCALE MODELS

MONOCOUPE (Illustrated)
STINSON RELIANT
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1/3 Size of 3 Real Planes!

$1.00 EACH

PLUS 35c FOR PACKING, POSTAGE AND INSURANCE

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G.H.Q. KITS
FOR DESIGN! DETAIL! PERFORMANCE! LOW PRICE! HIGH QUALITY!

Each of These G.H.Q. Giant 5 ft. Model Planes Contains:

Full-size Plans, all ribs, formers and curved parts clearly printed on best grade Balsa. Complete with **LARGE BOTTLES CEMENT AND DOPE**, different colors Japanese Tissue, Special Endurance Rubber, finished Ready-Cut 3" Wheels, Wire, Balsa strips cut to size, Washers, and . . . Movable Controls, shock-proof Landing Gear, Scale Details, Lettering, Numbering and Insignias, Flight Log, etc.

NOTE: Ask your dealer for our kits. If you cannot locate a dealer who can supply you, order direct from us. Send money order, check, stamps, or cash. Send only one dollar if you want express delivery, charges collect.

24 HOUR SERVICE ON ALL ORDERS

--and don't forget these marvelous G.H.Q. values:

12" SOLID SCALE MODELS — 10c Plus 5c Postage

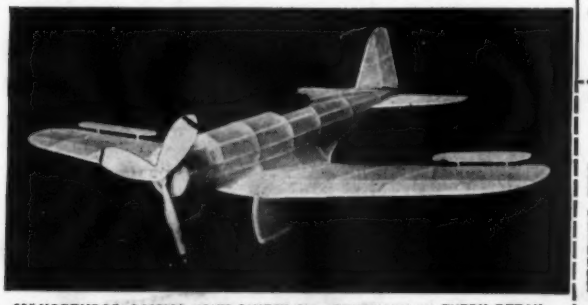
Each Kit contains full size exact scale plans with instructions and details, one or more printed balsa sheets, fuselage block, cement, and pontoon block, Nacelle block and wheels and bamboo where necessary. Send for one or more of these Kits today.

Boeing 247-D
Ryan Racer
G. A. Coast Guard Amphibian
D. H. Comet
Lockheed Orion
Sikorsky S-41
Douglas Airliner
Dewoitine D-33
U.S. Army Martin Bomber

Contains everything to build a 12" solid scale model of any of the above Kits.

36" FLYING SCALE MODELS — 50c Plus 20c Postage

G.H.Q. Scale Models are the best Kits your money can buy for appearance and flights. Buy one today and you'll buy a whole fleet of them. Get acquainted with G.H.Q. Kits and no others will do.



36" NORTHROP GAMMA "SKY CHIEF" 50c—COMPLETE IN EVERY DETAIL
Also 36" Douglas Y12 50c; 36" Curtiss A-8 Attack 50c

AT YOUR DEALER OR DIRECT

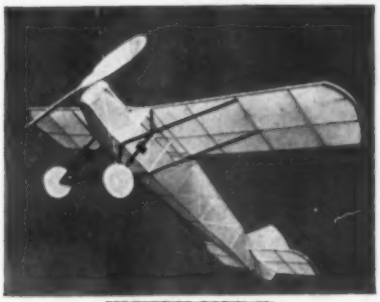
DEALERS! WE HAVE A COMPLETE LINE OF KITS FROM 10c TO $1.00. WRITE FOR DETAILS AND DISCOUNTS.

G.H.Q. MODEL AIRPLANE CO.,
564 Southern Boulevard, New York City

24" FLYING SCALE MODELS — 25c Plus 10c Postage

Each 24" G.H.Q. Kit is complete in every detail. A liberal quantity of everything. 18 models to select from at 25c each.

Puss Moth
Polish Fighter
Army Falcon
Sopwith Camel
Fokker D-7
SE5
Aeromarine
Army Hawk
Monocoupe
Fairchild "22"
Aeronca
Fokker D-8
Nieuport
Douglas Mailplane
Stinson "R"
Curtiss JN4
Bellanca



24" CURTISS ROBIN, 25c

APPROVED! We have met the requirements of the Junior Birdmen Institute with our 24" Curtiss Robin and we have been awarded the seal of approval! This proof of quality plus our extreme low prices make G.H.Q. Kits the biggest model airplane values!

Buy these kits at your dealer or order by coupon

G.H.Q. MODEL AIRPLANE CO., 564 SO. BLVD., NEW YORK, N.Y.

Enclosed find $..... Please send the following kits as checked.

12" SOLID KITS
- ☐ Boeing 247-D
- ☐ Ryan Racer
- ☐ G.A. Coast Guard Amphibian
- ☐ D.H. Comet
- ☐ Lockheed Orion
- ☐ Sikorsky S-41
- ☐ Douglas Airliner
- ☐ Dewoitine D-33
- ☐ U.S. Army Martin Bomber
- ☐ Monocoupe 145-D

24" FLYING KITS
- ☐ Curtiss JN4
- ☐ Bellanca
- ☐ Nieuport
- ☐ Douglas Mailplane
- ☐ Stinson "R"
- ☐ Puss Moth
- ☐ Fokker D-7
- ☐ Fokker D-8
- ☐ Polish Fighter
- ☐ Monocoupe
- ☐ Falcon
- ☐ Aeromarine
- ☐ S. E. 5
- ☐ Sopwith Camel
- ☐ Aeronca
- ☐ Fairchild
- ☐ Army Hawk
- ☐ Curtiss Robin

36" FLYING KITS
- ☐ Douglas Y-10
- ☐ Curtiss A8 Attack
- ☐ NorthropGamma "Skychief"

5 FT. FLYING KITS
- ☐ Monocoupe
- ☐ Stinson Reliant
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SEND MONEY ORDER, CHECKS, STAMPS OR CASH. Don't Fail to Include Postage for Each Kit With Your Order. ONE-DAY SERVICE.

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Four Hard-Hitting Daisys—See 'em at Your Dealer's

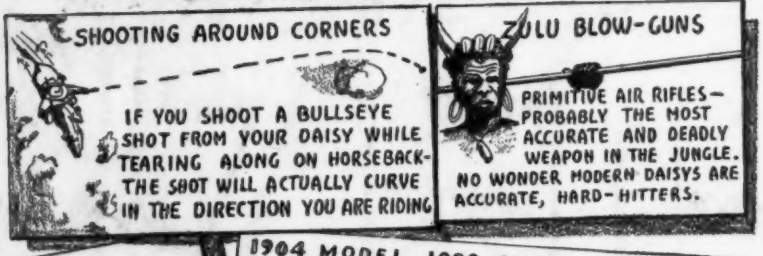
★ **No. 25 Daisy Pump Action, 50 shot repeater**—the biggest Daisy made.
$3.95

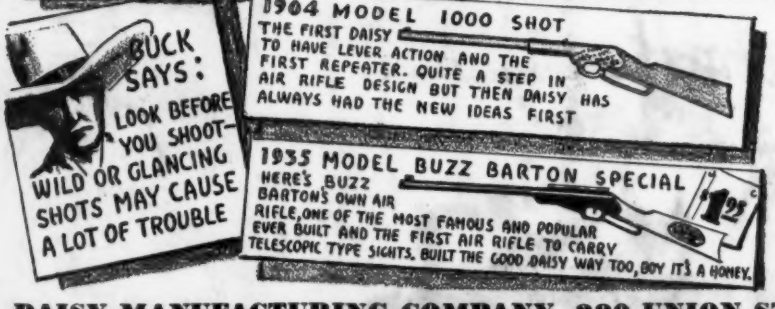
★ **No. 103 Daisy Buzz Barton Super Special,** 1000 shot carbine type.
$2.50

★ **No. 102 Daisy 500 Shot,** carbine type... It's a knockout.
$1.50

★ **No. 101 Daisy Single Shot** ...It's *all* Daisy too—see it!!
$1.00

GET READY FOR VACATION AND CAMP—GET A DAISY AND YOU'RE IN THE FUN!!


SHOOTING AROUND CORNERS
IF YOU SHOOT A BULLSEYE SHOT FROM YOUR DAISY WHILE TEARING ALONG ON HORSEBACK-THE SHOT WILL ACTUALLY CURVE IN THE DIRECTION YOU ARE RIDING
ZULU BLOW-GUNS
PRIMITIVE AIR RIFLES—PROBABLY THE MOST ACCURATE AND DEADLY WEAPON IN THE JUNGLE. NO WONDER MODERN DAISYS ARE ACCURATE, HARD-HITTERS.


BUCK SAYS:
LOOK BEFORE YOU SHOOT—WILD OR GLANCING SHOTS MAY CAUSE A LOT OF TROUBLE
1904 MODEL 1000 SHOT
THE FIRST DAISY TO HAVE LEVER ACTION AND THE FIRST REPEATER. QUITE A STEP IN AIR RIFLE DESIGN BUT THEN DAISY HAS ALWAYS HAD THE NEW IDEAS FIRST
1935 MODEL BUZZ BARTON SPECIAL
HERE'S BUZZ BARTON'S OWN AIR RIFLE, ONE OF THE MOST FAMOUS AND POPULAR EVER BUILT AND THE FIRST AIR RIFLE TO CARRY TELESCOPIC TYPE SIGHTS. BUILT THE GOOD DAISY WAY TOO, BOY IT'S A HONEY.
$1.25

BOY! Vacation's here again—NOW you've GOT TO HAVE A DAISY. Think of it . . . all those swell, warm, sunshiny days ahead—lots of time to do just as you please and your good ol' Daisy ready for the fun ANY TIME.

Just fit YOURSELF into this picture—your duffel's packed—your Daisy's checked over and oiled, there 'tis right on top of the heap where Daisys ALWAYS are—a good supply of BULLS EYE steel shot and your dog just ready to *bust* with excitement, rarin' to go. Can't fool him, he knows that picture means FUN—lots of it—for EVERYONE.

Boy! There's nothing like a hike in the open country to build a fellow up—plenty of action too—a swell chance to pull a few of Buck Jones' trick shooting stunts. There's a *real fellow* for you; he says *all* the youngsters out his way are Daisy fans and they sure can pick 'em off with those Daisy shootin' irons.

Don't be a WISHER or a BORROWER all your life, GET BUSY, go see your Daisy dealer TODAY. He has genuine, hard-hitting Daisys for as low as ONE BUCK and are they HONEYS. GET A DAISY AND YOU'RE IN THE FUN!!

DAISY MANUFACTURING COMPANY, 280 UNION STREET, PLYMOUTH, MICH.

DAISY AIR RIFLES